

AVIATION WEEK

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JULY 16, 1951

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A YEAR



SUBMARINES BEWARE!

A fast lens catches a GRUMMAN GUARDIAN in mid-air close-up. Two versions of this carrier-based plane work together to protect ships of the U.S. Navy from submarine attack. Some GUARDIANS carry powerful detection devices. When these "hunters" locate an undersea enemy, more heavily armed, bomb-carrying GUARDIANS, like the one shown here, come in for the "kill."

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Contractors to the Armed Forces

Solves high-altitude pumping problem!



Compact new Sundstrand control oil pump developed for high-flying jets



Highly essential part of a fuel regulator for jet engines in this remarkably compact control oil pump developed by Sundstrand, its patented "Rolls-Roll" pumping principle provides special characteristics for high altitude performance and assures a uniform flow at high altitudes. The compactness of its electronic design and its favorable high speed characteristics make it possible to fit this pump into an extremely limited space. Success of its original application already has led to adaptation for other purposes. Developed in answer to a request for a control actuator, it is a typical example of the results accruing from Sundstrand's *reliable research, expert engineering, precise production*. For data on this pump, write to Sundstrand.

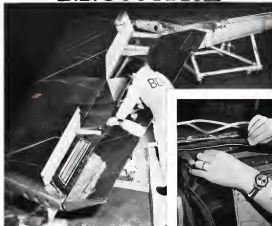


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B.F. Goodrich



A seal that saves muscle zips off to save time

Bottom moments per governed **B**ushings in the B-47 Strategic Bomber's fuselage, in order to handle light and smooth. They decided to have them made of stainless steel, for example.

When a wire in the elevator, they ran into a problem. They wanted to put a flap seal between the elevator and the stabilizer. Its purpose was to prevent flow of air through the flap seal, make way, manual operation of the controls much easier.

But there was a hitch. Removing the flap seal for elevator maintenance would be a long, costly job.

B. F. Goodrich engineers had an idea that BFG Pressure Sealing Zippers, which had saved the work for elevator seals, would work just as well on elevators. Tests showed they were right.

The zipper's overlapping rubber lips provide a 100% effective seal against air pressure. It takes less muscle to remove the elevator. And the zipper also puts a local handle into elevator maintenance. Instead of removing one screw after another to detach the flap seal, the elevator can simply unzip it. If a new elevator is installed, the new and old halves of the zipper mesh perfectly. B. F. Goodrich Pressure Sealing Zip-

pers fit snugly around complex shapes. They can be removed with a screwdriver or hand. They save space and weight. Successful applications include airplane doors, air ducts, inventory covers and airtight protective coverings.

For information on Pressure Sealing Zippers, their construction, applications and available styles, write for a free copy of our new booklet, *Hold Everything! The B. F. Goodrich Company Airtight Division, Akron, Ohio.*

B.F. Goodrich
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CHASE AIRCRAFT CO., Inc.
WEST TRENTON, NEW JERSEY



SIDELIGHTS

No More XC-99s

Implication is contained in Chief WFO sent quarterly report to the President that the XC-99 is the Douglas C-124 would be converted to the XC-99, the transport version of the B-56. Wilson had asked USAF for a re-evaluation of its latest plans for the XC-99 along with the rest of its military Air Force acquisition. "No further production of the XC-99 is contemplated." Since a total of Republic XP-99s is yet to be ordered.

Those 'Underground Runways'

The current report that Navy is spending \$114 million for "underground runways" in North Africa is labeled false by Navy officials. Navy tells American Warps it has only one long-term facility in the North African area. It is possible the reason given following a recent fire in an underground ammunition storage facility in that area.

Air Force Roundup

USAF has awarded Convair a new contract for further modification and overhaul of B-56. The contract, covering conversion of A-1, B-56s to D-56s was begun in 1953 and will continue through 1957. A new survey shows 47% of USAF regular aircraft are in college production, in contrast to Navy with 67% and Army with 71%. USAF plans for two additional B-56s were known to be damaged, 10% of which 128 were destroyed on the ground. For Air Force, the first 12,000 aircraft during 51 weeks of combat covered in the report.

Air Force representatives which include equipment divisions and personnel strength in being—about double that of the rest. The Secretary of Defense reported USAF expenditures of \$6,137 million for the 1953 fiscal year ended July 1, compared with \$5,234 million for the 1952 fiscal year. The B-56s will be used to construct the big bomber prototype is now on a test, being at USAF headquarters in test range and being being produced. After the test, it will be provided to a school to train ground crews. USAF personnel has a critical shortage of engineers and other civilian specialists people for Chicago, South Bend, Milwaukee, Indianapolis, Minneapolis and St. Louis, for roles in electronics, fuel & lubricants, and fuel & power. USAF central Air Procurement District Office, Chicago.

The Press

Western Flying magazine changes its name to Western Aviation with the July issue. V. E. Thompson, publisher, is now at 1000 Broadway, New York City. The magazine is published by Western Aviation and other companies, first June 20. (Continued on page 14)

NEWS DIGEST

DOMESTIC

Ryan Aeronautical Corp. has been awarded a subcontract by Douglas Aircraft to build a small number of complete rocket motor for a surface-to-air missile being developed by the latter for Army assistance.

Big Gen. Donald F. Stoen, commanding general of the Western Air Procurement District in Los Angeles, has applied for retirement from active duty. He will be succeeded by Brig. Gen. William M. Moege, Deputy Commandant of the Western Air Defense Force. Stoen has headed the USAF's western packaging operations since 1949, after his return from the Pacific theater in 1950.

Army-Air Force agreement of Ft. Rigg and Camp McDowell, N. C., between Aug. 1-15, 1953, will involve more than 100,000 troops and approximately 400 planes. Designated South-east Force, the exercise is planned to be the largest peacetime U.S. military training exercise in southern states since World War II.

National meeting mark of 367 men was held by Richard Johnson at the 15th National School Counselor, at Haverhill, Mass., N. Y. Johnson kept his AF-5 single water shift for eight hours and between the previous award by 42 as

Los Angeles Airways' third register crash, second in three weeks, has resulted in LAA, according to its operating staff with the crash is investigated. The most serious Skunk 541 hit the ground near Pasadena, Calif., killing CAA supervisor Wynne. Also who was flying the craft and flying LAA pilot John DeHaven. Previous crashes occurred on takeoff when tail section failed. Design to blades and rotor head is being repaired.

Large aircraft maintenance depot, to cost approximately \$62 million, is planned by the USAF for Lancaster, Pa. The new depot, which will employ up to 30,000, will have a runway capable of handling all planes now being used as airports, according to a USAF spokesman. It will represent the present Otisville AFB, about 25 mi. distant.

B&W E-2000s, based on a MATS C-141 recently set a mark of 1,400 flying hours between incidents without any signs of breakdown. The normal time for this engine is 1,200 hr. the engine

was down under temperature margin from 128 deg. F. to below zero, and was subjected to inhibiting sand and salt water.

Civil Aeronautics Board plans to appeal recent Washington, D. C. district court ruling preventing CAA from restricting flight hours of large mail carriers by other airlines in three months between major cities and eight months between pairs of other cities. CAA will now take the ruling before the Supreme Court of Appeals, and postpone the effective date of its ruling until after the outcome of its new appeal.

Belmont Production Administration has declined the industry an action at El Centro, Calif., a critical test for defense housing. The El Centro housing shortage was caused by transfer of more than 1,000 military and civilian personnel from Wright Patterson AFB 31 Central Air Station is designated as a joint parachute test center.

FINANCIAL

Mid-Continent Airlines has reported a net profit of \$24,511 for May, after provision for taxes. Operating revenues were \$132,765, up 27.7 percent over May, 1952. Net profit for the first five months of 1953 was \$68,491, against \$39,849 for the same period last year. Loss on the current fiscal year, however, was in question during the 1952 period, was blamed.

Pan American World Airways declared a dividend of 25 cents a share, payable July 6 to holders of record July 30. This is the first dividend this year, previous one as the amount of 50 cents being paid Dec. 12, 1950.

INTERNATIONAL

George Geoffrey Smith, MBE, a director of the Associated Halls of the United States, and managing editor of the many Little Publishers—including Flight magazine, for which he was publisher for 10 years—died at his home in Radlett, England, June 18. He was 67. Smith was also well known for his book, "The End of the War", first published in 1947.

Canadian Pacific Airlines has purchased three DC-64s from Douglas Aircraft for its trans-Pacific operations to Australia and Japan. The DC-64s are scheduled to replace Constellation North Star used to Texas Airways Airlines.

GOOD READING FOR GOOD BUYING

A complete listing of Aircraft's products for the aviation industry—BOTTLED, Laminar, Helium and Tru-Ton electric-mechanical systems and AMOLAR right-angle level gear drive units—appears in the 1953 AERONAUTICAL KITCHENING CATALOG. It will pay you to examine closely the current, wiring diagrams and working drawings of these units which most AERONAUTICALS and which are used on many modern planes.

An entire copy of this informative chart is yours on request.



AERONAUTICAL KITCHENING CORPORATION
1614 Chester Avenue
Burbank 6, New Jersey
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TORONTO, CANADA (AERONAUTICAL)



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 HARVEY, ILLINOIS DETROIT, MICHIGAN

WHO'S WHERE

In the Front Office

Harry S. White has been appointed vice president traffic and sales for Southwest Airways. White is a deputy of the center and due to see the head of the American Transp. Assn.

Harold A. Olson has been named vice president traffic and sales for Pacific Northern Airlines. A veteran of 35 years in the transport, Olson held administrative posts with American Airlines and Capital, before taking the position of general traffic and sales manager for PNA in 1947.

Raymond D. Ardies has been designated vice president engineering, of Mulvrents-Cosmopolitan Laboratories, Tulsa. He was formerly in the staff of the dynamic analysis and control laboratory at Massachusetts Institute of Technology, where he had been engaged for the past four years in the design of hydraulic servo components and extra points for the MIT theoretical flight simulator as well as the engine project. **Merwin Donald C. Griffin** has been named chief engineer.

Changes

F. N. Jones, connected to Air Materiel Command, has been retained by Boeing Airplane Co. in full time consultant on production matters. His full assignment is at the Wichita division.

William A. Rosenfeld has been designated manager of materials and purchasing for General Electric Co. A. T. Chasement has been appointed manager of GE's Los Angeles (Calif.) turbine division and **William V. O'Brien** has been named manager of the GE's Aircraft Division. **O. R. Smith** recently joined H. Lang who now heads GE's public relations organization.

Robert Lewis and **John F. Kennedy** have been named superintendents of two plants in male parts for Ford Motor Division's Wright 141 Superjet at engine which the division will build, make, test, and assemble to the plant laboratory plant and magazine parts for the J45 and Kennedy will work at the facility for testing steel and non-steel machining and rolling of subcomponents.

Richard Owen has been placed in charge of a new communications and electronics department at the Los Angeles Airplane Inc. He was previously assistant superintendent communications for Southwest Airways.

J. L. Foster has been named assistant to vice president of Corbin's San Diego division.

H. L. Roberts has been appointed manager of the new regional office of the Air Transport Assn. at Ft. Worth, Tex.

Harold E. Barker has been appointed vice manager for Kansas, Kentucky, Corp., and **Frank A. Randolph, Jr.** has been named chief cost estimator.

Jack A. Bach, a new military planning assistant in the aviation group of the AIA, Frank S. Kover has been put in charge of the related aviation department.

INDUSTRY OBSERVER

► **Chase Aircraft Co.**, KC 113 crashed during test flight at Elgin AFB, Ill., following completion of recent long range mission. Inspection trails between that place, the Fairchild C-119 and a Douglas C-124 DC-3. Mission progress taken of the plane during test flight showed that the left Pratt and Whitney R-2800 failed just after the plane became airborne. The pilot was killed.

► **Large scale military transport production program** for next several years has been crystallized by Pentagon planners around Chase C-124, medium troop and cargo-Fairchild C-119, long-range freight and passenger-Douglas DC-6A and Lockheed Super Constellation 1049, strategic heavy-Douglas C-124, aerial tanker-Boring KC-97, all-purpose transport-Lockheed L-104.

► **New type transports on order** and available for military commission in an emergency by U. S. and allied foreign nations are approximately as follows: 100 Douglas DC-6A's and B's, 100 Constellation 740A's and 1049's, 100 Martin 4-0's and 100 Convair 440's.

► **The Roto of Canada Ltd.**, subsidiary of a British firm, has completed a \$50,000 property purchase from the city of Toronto for the building site of a 32-million aircraft production instrument manufacturing plant. Construction is expected to take 18 months.

► **Boring Airplane Co.** is moving five departments-B-50 fuselage structure, B-50 and C-47 wing structure, major subassembly and assembly assembly—from its Seattle Plant 2 to Renton, Wash., to make room for contemplated B-52 production. The move involves shift of approximately 1,200 employees and completion of the outfit of B-50 and C-47 assembly work to Renton.

► **North American Aviation's** digital differential analyzer, built by Computer Research Corp., is being installed aboard one of the company's aircraft to determine answers to electro-mechanical problems encountered during flight testing of guided missile components. General tests have proven the machine suitable under varying conditions of altitude, temperature and aircraft-type vibrations.

► **Country divisions of Sweden's** own jet fighters, the Saab 29 "Byggnad" have furnished the F 13 fighter wing of Nörvingen with replacement for its de Havilland Vampire. The F 15 wing was the first Swedish unit to fly the Vampire, back in 1946.

► **First photo** of the Ye-10, swept-back light jet bomber of the Red Air Force shows the installation of wing tanks. One is small—approximately two ton capacity in length. Aircraft is in squadron service throughout the Red zone of Germany, and appears frequently over Berlin.

► **Curtis-Wright Corp.** has entered into agreement to purchase Buffalo Steelcase Welding Corp., Buffalo, N. Y., subject to satisfaction of latter company's stockholders who will meet July 19. If deal is made, C-W management will move its main plant from Charlotte of commercial blades, previously under a new C-W division. Blade process under consideration is a "vib" technique in which mold is sprayed with plastic to give very precise, lowest product.

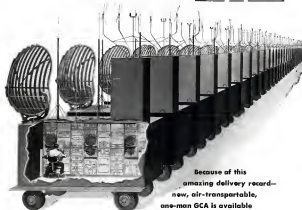
► **Purchase** of a Convair 440 is being solicited by Curtiss-Wright for purpose of using the aircraft as a test vehicle for its Turbo-Convair 440-150.

► **Prototype** YB-47C Stratojet will make its first flight later this year. Project will be furnished by four Alcoa J-35 A-1's instead of the six jets used in the B-47B.

► **Douglas X-5**, Air Force's new supersonic research craft, is being tracked for flight in sub-atmosphere. Craft uses a double-rod design unit. Reported design performance is 2,250 mph at nearly 50,000 ft. altitude.

Gilfillan Delivers...

a complete GCA Radar every 48 hours!



Because of this
amazing delivery record—
new, air-transportable,
one-man GCA is available
for USAF all-weather operation
anywhere in the world!

New GCA Radar for landing aircraft in bad weather is one of the most complex electronic devices ever constructed. Each GCA has over 35,000 custom-made, hand-routed units—components developed for GCA alone. Yet Gilfillan turns out GCA with assembly-line regularity.

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New USAF GCA, instant safe, all-weather landings of our jet fighters, bombers and air crews overseas and at home. To supply the greatest heavy need for this vital extension of our radar power, Gilfillan has pioneered mass production of this highly intricate, custom-made precision radar equipment for the United States Air Force.

Gilfillan
GCA

LOS ANGELES, CALIFORNIA

AVIATION WEEK

Vol. 35, No. 3
JULY 16, 1951

Truce May Slow, But Not Halt Production

- Korean peace may bring cut in military budget now before Congress, but air buildup will continue.
- Present backlog stay the same, and that means a high level of business for some time to come.
- Delivery dates may be pushed back, but still output for rest of this year will go on much as scheduled.

Prospects of a truce in the Korean war last week stirred Defense Department officials to quick action to ward off a threatened cut in military appropriations.

Government and industry air officials had no worries about any immediate cutbacks in production, that isn't in the cards.

Production may be slowed down—but not this year. That would not be a cutback. Production would continue to build up, but at a slower rate.

And even cut in the fiscal 1952 military budget—now before Congress—would still leave the manufacturing industry glutted with orders. Backlogs of the 15 leading companies are estimated to total \$7.6 billion (page 46). This means good business for several years. But the line isn't so hot.

At the very time negotiations in Korea were dickering for a truce, Air Force and Navy were asking the Joint Chiefs of Staff to approve proposed requests for more capacity for fiscal 1953, which begins July 1, 1952.

► **Air Force Asks—USAF** wants to increase output of a 35-wing force by July 1952. It will be 120 wings by July of the following year, that is, would need for a more modest boost sooner to 100 wings. The 120 wing plan would require \$4 billion more than the \$18.8 billion allowed by the Administration for the 1952 fiscal year. To achieve a fully sustained 95-wing force by July 1952, and require about \$23 billion during the 1953 fiscal year.

As at now, this is not. There's no likelihood of increasing the \$60 billion military budget this fiscal year. At best, JCS will approve a build-up to 130 wings during the 1953 fiscal year. The Navy wants its present peak of 15 carrier wings by July 1952, and 18-20 wings by July 1953. The Navy's expansion has been the most modest of the three services. It has emphasized the re-equipping and re-

commissioning of ships. New Navy wants the aircraft to equip them.

The backlog is Washington, last week even possible cuts in defense appropriations were based on personnel.

The Administration and Congress have blown hot and cold on the military with each new shift in the international scene since the end of World War II. Strength for Defense—in public opinion, supplies and increasing before Congress, Defense Department spokesmen from Secretary George Marshall down the line have taken the attitude to meet military handouts and a let-down in the defense program.

Defense Minister Charles E. Wilson summed it up in his radio-television speech: "We cannot see diplomatic victories against an enemy of this kind unless our airplanes are backed up by strength."

Talk on Capitol Hill provided that and other warnings. The \$60-billion 1952 fiscal year budget isn't still big, the effect on production this year will be slight—or none at all.

There are some grounds to believe that many Air Force people would not be too unhappy if a Korean settlement resulted in a slower rate of production. It would enable them to go back to their pet project of procurement through testing, and modification after modification to keep up with the rapidly changing (including and operational) demands.

► **No Letdown—**The thing obvious were remembering last week was that Air Force plans for its build-up work would have been the same if War began. The reason was simple.

Secretary Thomas K. Fowler highlighted it in a television interview last week. "There have been no changes in the requirements of the air forces that was already planned before Korea, plus whatever capacity could be selected in plants that were in operation at that time."

"Present schedules call for tripling the current rate of deliveries in the next 12 months or so, which is a big increase but still somewhat short of targets set by the President when he proclaimed the national emergency." At that time, the President called for a 50 per cent increase.

In a way, that admission is a grim triumph for the Air Force, which all along has been unhappy about the philosophy of building a force of production, and not a force of peace.

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► **Aircraft Shipped—Military** aircraft production for the last quarter of the year slumped badly by such a low point as fact, that military planners visited release of military aircraft-weight production figures because of their possible international political effect.

Here then, the build-up has stayed in current rate, but it is possible for production this year to triple last year's output.

The key point in the Korean truce situation is that no matter what happens, the effect on production this year will be slight—or none at all.

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French Show Progress in Civil Planes

Advanced design of lightplanes offers best chance for leadership.

By Ross Huxford
(McGraw-Hill World News)

Paris—French-built light planes, including some of the world's smallest, are the show at the Nineteenth International Air Salon in Paris.

Although military planes dominated in numbers both at the vast exhibition hall in the Grand Palais and at the flying demonstration at Le Bourget field (Aviation Week July 9, p. 17), visitors crowded shuttles about the light craft-planes meant just for pleasure and convenience.

Chances to France—French ingenuity in design gave them plenty to show and talk about. It is in the field of light planes, especially light planes built, that France puts forward its claims to world leadership.

Four of the new French light planes were particularly outstanding. The SIFA 200, a two-seater propelled two-stroke that can be sold for \$12,000 to \$15,000, was the top attraction among sport planes.

The SIFA 200 is powered by a Turbomeca Pallas turbojet with 155-hp thrust and has a maximum speed of 267 mph, 34 crates at 230 mph. The plane's ceiling is 26,200 ft, and its range is between 510 and 372 miles.

Dimensions: wingspan 21.6 ft, length 16.5 ft, height 5.8 ft, weight empty 856 lb., weight loaded and carrying two persons 1,350 lb. The plane has a retractable bicycle landing gear. It is all metal construction.

► **Single Engines**—Among other interesting small planes were:

► **Fourm Cyclope II**, another jet half-jet, was designed for ambidextrous flying. Its makers claim it can be used both in take and advanced flight training. The Cyclope is a rotating monoplane powered by a Turbomeca Pallas turbojet. It made its first flight Aug. 28, 1951.

Its maximum speed is 217 mph., and its initial rate of climb is 1,374 ftm. Dimensions: span 19 ft, length 22 ft, height 5 ft, 10 in., weight empty 944 lb., weight loaded 1,371 lb., ceiling 28,527 ft., range 187 mi.

► **Fourm Generon II** basically is just two Cyclope II planes joined together by a control wing section. Equipment and controls are the same in both cockpits so that either engine can operate separately.

The Generon is designed to answer the requirements of a brilliant aircraft for jet engine tests and special experiments. Its maximum speed is 265 mph.,



LIGHTPLANES DOMINATED the crowd at the 1951 Paris Air Salon.



SIFA 200.



Hard Dabon HD 10



HD 10



Fourm Cyclope II



Araval 1900



Nord 200

an initial rate of climb is 1,083 ftm; ceiling 18,100 ft, range 107 mi.

The plane has fixed four-wheel landing gear. It made its first flight May 7, 1951. Dimensions: span 19 ft, 9 in.; length 22 ft, 6 in.; height 5 ft, 6 in.; weight empty 1,395 lb., weight loaded 2,351 lb.

► **Hard Dabon HD 10** is an experimental aircraft with a long, very narrow wing that has been under test since its first flight Aug. 5, 1948. Its makers say the HD 10's high aspect ratio wing (35:1) loaded by lift stress gives a lift-drag ratio higher than that of a cantilever wing of the same span and area.

Hard Dabon claims the wing design improves flying performance and enables the plane to carry 35 to 40 percent greater weight with the same power and at the same cruising speed as planes with conventional wings. The company now is building a medium cargo plane with the same principle.

The HD 10 is powered by a Propa 750-cu. in. engine. Its maximum speed is 158 mph. It is equipped with retractable bicycle landing gear. Dimensions: span 30 ft, 6 in., length 16 ft, 10 in., width of wing 15.75 in., wing area 48.5 sq. ft., weight empty 857 lb., weight loaded 1,365 lb., power loading 21.74 lb./sq. ft., power loading 15 lb./hp.

► **Target Plane**—In the corner of the exhibition hall the French Air Arsenal exhibited for the first time its new pilotless, radio-controlled target plane, the Arsenal 550. The target plane can be launched either from a 39-ft catapult or from a catapult position on a plane in flight. It is controlled in flight by radio and by a gyroscopic stabilizer. It lands by means of a parachute and is towed back to the ground by a primary line to assist in slowing the landing shock.

The Arsenal 550 can climb to 15,000 ft in nine minutes and reach a maximum speed of 160 mph. at that altitude. It can stay in the air about 45 minutes. Its ceiling is 10,500 ft., and it can be controlled by radio to a maximum range of 31.25 mi.

Dimensions: span 14 ft, 1 in., length 39 ft, 6 in., height 5 ft, 2 in., total weight 3,452 lb.

► **Transport**—In the field of transport aircraft, the French aviation industry showed off five planes. All five have been thoroughly tested and now are being produced in series.

The biggest of the group is the SE 3010 Aramis, a four-engine monster designed for long Atlantic routes. The Aramis have been ordered, and the first flight is scheduled to be delivered to Air France at the beginning of 1952.

► **Airquest** can carry a maximum payload of 13 tons at a cruising speed of 260 mph. Its range with a full payload

in 1,250 mi. With a load of only 100 tons, its range is 4,000 mi. The plane can carry 46 first-class passengers or 160 third-class passengers. It is powered by Pratt and Whitney engines of 3,500 hp each.

Dimensions: span 159 ft., 3 in.; length 125 ft., 9 in.; height 42 ft., 7 in.; weight empty 66,070 lb.

• **Breguet "60. The Phebe"** (double decker) was designed to carry cargo or passengers over distances of approximately 1,500 mi. Its fuselage is divided into two decks to give it a very large cargo capacity. Built in three versions, it can carry a total of 100 passengers on both decks, or 90 passengers on the upper deck and eight to ten tons of freight on the lower, or a maximum cargo load of 17 tons on both decks.

The plane is powered by four Pratt and Whitney R2600 CA 16 engines of 2,600 hp each. Fitted Breguet "Osmi Front" air under construction. Air France expects to get the first of these into service in the near future. Dimensions: span 141 ft., 1 in.; length 97 ft., 3 in.; height 31 ft.; weight empty 35,805 lb. Its cruising speed is 130 mph.

• **SO 30 P. Bistrotte** is a two-engine medium transport that already is in service on Air Maroc and Air Algérie lines. Fifteen of the planes have been produced to date and another 25 are on order or under construction.

The latest models of the Bistrotte are powered by Pratt and Whitney R2600 CA 16 engines that give it a cruising speed of 167 mph at 16,000 ft. The plane's maximum range is 50 percent of takeoff power is 1,302 mi. and it can carry 5,516.5 lb., payload 610 miles at 50 percent of full power.

Dimensions: span 58 ft., 2 in.; length 62 ft., 2 in.; weight empty 20,594 lb.; takeoff weight 42,990 lb.

An experimental version of the Bistrotte has been fitted with Hispano Neve turboprop engines. This plane, the SO 30 Neve, made its first flight on Mar. 15, 1951. Its performance has not yet been made public.

• **Nord 2511** is a two-engine military transport powered by Bristol Hercules engines of 2,040 hp each. A total of 150 has been ordered for the French Air Force. Because of its high wing and tail, the plane is easily loaded from trucks. It carries 940 gallons of fuel in the central section of the wing, and its range with a load of 31,504 lb. is 932 mi. Its maximum speed is 274 mph, and its cruising speed 235 mph.

Dimensions: span 100 ft., 7 in.; length 62 ft., 8 in.; height 20 ft., 6 in.; weight empty 12 tons, total weight 18 tons.

• **Maestri Dornier MD 335** is a two-engine military transport of which 300 have been produced or are on order.

Three French military bases anywhere already are equipped with this type of plane.

The MD 335 is a low wing monoplane with two tail fins. Its maximum speed is 230 mph, and its cruising speed 186 mph. Its range is 755 mi. It is powered by SNECMA 12 B engines and carries six passengers. Dimensions: span 60 ft.; length 41 ft.; height 15 ft.; weight empty 9,389 lb., total weight 12,567 lb.

• **Helicopters—Visages** to the solution in the Grand Place this year could travel to the flying show at Le Bourget field by helicopter from an improved helicopter terminal at the Gare des Invalides, just across the Seine from the exhibition hall. And at Le Bourget on July 1, there was in flight what the French claim is the world's first jet-propelled helicopter, the SO 1120 Aéro III.

The Aéro III is powered by a Turbomeca Artouste turbine giving 273 hp. Its rotor is driven by combustion chambers at the tips of the blades. Compressed air is fed through the hollow rotor blades to the combustion chambers where fuel is injected.

It has a maximum speed of 112 mph, and a cruising speed of 65 mph. Ceiling is 9,534 ft. and service ceiling 11,801 ft. Fitted with two seats it can fly at 50 mph for a period of two hours and 45 minutes.

The Aéro III, one of the proudest achievements of the French aviation industry, stood squarely in the center of the exhibition hall. Two other French helicopters—the SF 3120 and the two-seat Breguet BR III—also were on display. The only American or British planes in the Grand Place were helicopters—the Bell 47 D1 and the Bristol 173 Mistral.

Undoubtedly the prominence of helicopters in the Paris show was partly due to the fact that helicopters are among the easiest and most advantageous aircraft to develop engines. But whether some way with the engines that the engine on helicopters this year was also a clue to the future of aviation is a question to which the engineers had extremely much to say. It could be expected to play an important part.

Navy Names Kaman In Gas-Turbine Test

Kaman Aircraft Corp., Windsor Locks, Conn., is named winner of a Navy competition for development of gas-turbine engines for use in the control section of the wing, and its range with a load of 31,504 lb. is 932 mi. Its maximum speed is 274 mph, and its cruising speed 235 mph.

Dimensions: span 100 ft., 7 in.; length 62 ft., 8 in.; height 20 ft., 6 in.; weight empty 12 tons, total weight 18 tons.

using the Boeing developed 502-2 gas turbine as a helicopter engine.

The Boeing 502-2 is a small propeller engine developed from the original Boeing 500 turboprop engine. The 502-2 weighs 114 lb., has a single-stage compressor and two-stage turbine with a geared propeller drive. The engine develops 180 shaft hp, is 42 in. long, has a diameter of 22 in., and a frontal area of 2.2 sq. ft.

Navy announced that it has also been testing the Boeing engine for possible adaptation as a high-speed boat power plant. The Boeing Co., meanwhile, has been modifying the engine in a large trailer truck, as possible application for the conventional diesel engine.

The gas turbine has been under an additional study by all three military services because of inherent engine plant simplicity. Navy has advantages of the gas turbine over the conventional piston engine for use in helicopters because of mechanical simplicity and light weight, lack of centrifugal clutch and cooling fan, considerable savings in weight, and ability to operate on kerosene as well as with high octane gasoline.

Kaman has been awarded approximately \$100,000 for its gas turbine engineering program.

Four Awards End Basic Pilot Program

Recent awards of four additional civilian flight school contracts by USAF for basic pilot training complete the program of nine school contracts, but unsolicited bids will be kept on file at AMC for future reference, in event of additional expansion.

Four new schools will be offered by successful bidders as follows:

At Tucson Air Station, Milwaukee, at Midland, Aug. 21.
Aviation Associates and Southern Airways, both at Atlanta, at Birmingham, Ga., Aug. 21.

Day Aero Tech, Inc., Chicago, at Miami, Aug. 21.
Sov Air Inc., Raleigh, N. C., at Kansas, N. C., Nov. 9.

Four schools previously announced as standby in operation as follows:
At Greenville (S.C.), at Ft. Collins, Ariz., at Butler, Pa.

At Columbus (Miss.) AFB, California Eastern Airways, Inc., Oakland, Calif.
At Spencer Field, Moline, Ill., at Hartsfield-Pilling Field, Charleston, S. C.

At Burtow Field, Va., Garner Aviation Co., Richmond, Va.

The ninth school will be opened July 9, at Roswell, Texas, by Texas Aviation Institute, San Antonio.

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PRODUCTION



PICTURES ASSEMBLED in background, airplane manufacturers' representatives' data to explanation of new production techniques.

Industry Views, Approves Optical Tooling

Demonstration of Republic method results in broad acceptance of principle, but differences on details.

By Thomas M. Sell

Republic Aviation Corp. demonstrated its optical tooling methods at the 1952 Air Force Symposium Depot in Maywood, Calif., during a four-day industry-wide show, and this is what it passed.

The aircraft industry is unanimously agreed that there is a real future in optics to establish the base reference line for aircraft manufacturers' want to experiment with their own about in working from the optical reference line—whether it be a cathometer, optical positioner, auto indicator, or whatever.

Manufacturers consider the application of optics to tooling still in the exploratory stage. They showed no inclination to "buy" the Republic system whose alignment points are set by the Universal Optical Positioner. Nor did they go much for the clamp type tooling, an accessory which both Republic and the Air Force hold dear to their hearts. The tooling requires constant re-orientation type yet do not have sufficient advantages for their adoption at this time.

Big Turn-Out.—The industry-wide demonstration was attended by an important victory for optical tooling. More than 230 leading representatives from 12 companies attended, plus a considerable number of several foreign representatives. (The industry-wide demonstration replaced the originally scheduled industry at the Lockheed and North American factories.)

The over-whelming interest greatly pleased the Air Force. It expects to get much more "follow through" from the companies now than it did from the Air Force demonstration six months ago.

One of the closest examinations of industry looking on optical tooling was made by Steve Bean, chief tooling engineer at Lockheed Aircraft Corp. (Lockheed, like Boeing, has been working in its own method of optical tooling for about a year).

Bean told Associated Week, "We believe all possibilities of optical tooling haven't been explored yet. We are working with an optical line of sight, the same as Republic. But we work from that line of sight a little different only. It is too early to make down the requirements to the problems."

Commenting on the Republic system, Bean said he thought the optical positioner is fine if you are going to use paired connecting fittings Lockheed does not.

Pin It.—Morse—Commenting on the fact that Lockheed has analyzed cost and weight and has studied all the advantages and disadvantages of standardization and assembly and found the advantages do not outweigh the disadvantages. Lockheed still performs welded structures.

He related on this. In all respects except weight, he said, welded structures are equal or superior. Chicago got you about 100 percent savings compared to 75 percent for welded structures. But on the other hand, you don't see any such money as welded structures. Furthermore, you aren't limited in size of piece. Lockheed and standard fittings in the last war, Bean said, but couldn't

get them once and had to buy oil and pipe.

As for portability, you can build welded structures which can be taken apart. Lockheed is doing the same. They can be moved apart to readily and assembled accurately without difficulty and without mechanical fittings at every place.

Beans says that wasn't designed for breaking can be cut apart and reassembled. You do it by building a standard joint before cutting, using precision rings with accurate spacers. North American did this on A-1 jigs sent to Colombia.

The Important Thing.—Marilyn Kestelover, Republic's chief tool designer, said in remarks at the end of the conference: "The important thing is to use optics to set measurements. Optics should be used to set the standards. The yard stick, the little tools all give you a good job. It is a question which is more accurate, more effective for you."

Pin It.—Schneider of Lugs Equipment Co., Chicago, told Associated Week: "I don't think any of the subsidiaries for Republic's positioner are going to support it. All of them (the subsidiaries) say they are going to make one, but I don't think they will."

The Money Angle.—Manufacturers were very cost conscious regarding clamp tooling. Kestelover replied that cost data is difficult to judge. But he stressed that you couldn't waste the cost off in a one-time use of savings. Nor would it be practical for one company to go into tooling extensively. It would have to be industry-wide in that manufacturing costs of the end products could be brought down and one manufacturer.

(Continued on page 24)

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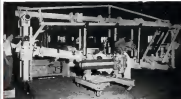
Optical Tooling From Coast to Coast . . .



UNLOADED FROM C-119 from Republic's plant in New York. Below it . . .



SET UP in AF Depot at Maywood, Calif. Port frame member goes in place. Then . . .



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Continued from page 10, Bulletin 14, 15

The use and value of S&S White flexible shafts in a series of driving aircraft accessories is fully demonstrated in the crop duster helicopter shown above. The shaft transmits power from the airframe gear box to an impeller-type pump which drives the insecticide to the spray nozzles. Can you think of a simpler, more effective way to do the job?

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KASTELOWITZ: The principle is the thing.

facture wouldn't have to carry big stocks.

Kastelowitz and Republic weren't using castings exclusively, but that casting makes up good fixtures and, too, they help tool design and they help standardization.

► **Vandoren—Musicians**, generally, were pretty well sold on the Taylor-Holmes and other brand optical equipment. But they all have different methods of string vertical measurements and measuring lineal distances.

► **North American** thinks it might combine optics with its own positioning tool to obtain level measurements.

► **McDonnell Aircraft Corp.** is working out a method of using accurately measured tubes in place of the positions to obtain measurements of the reference line.

► **Lockheed Aircraft Corp.** uses its auto-reflection and third back light average went to set fittings perpendicular to a line at right. Lockheed claims the use of auto-reflection is a valuable asset in optical tooling because of the very great accuracy that can be obtained, the size and speed with which good results may be produced and the very small size of the instrumentation. Laser light makes it applicable in so many places that are inaccessible to the T.M. collimator, or other series of locating to slants deployment and life.

Lockheed was a physiological method to check distances along the basic line at right. This is Lockheed's second development, following experience with extended range monometer, photo-optical line from a leading bar, laser station layout on the ground and laser station pin ball location on the big floor.

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Representations of principal series over \mathbb{R}

and optical instruments to determine containment of length. Locked ones, however, are of a polygonal prism in an optical system with a polygon bar. Holes are drilled accurately at five-inch intervals on the bar and projected optically to the eye.

The use of the pentaprism allows for a great deal more latitude in aligning the optical system to a line of sight without incurring any appreciable error. Lockwood says. In other words, the "setup error" using a telescope prism instrument is compounded by the distances involved, but the error of setup of a pentagonal instrument is the same.

► **Thoughts for Hunting**—There was considerable interest in the Lockheed system. Many trading engineers thought they might be able to combine some of its best points with the Republic and their own particular trading tricks, particularly the use of the probe pen as a connection with a processor line. They were also excited about Lockheed's simple methods in developing optical applications without expensive or complicated equipment. One example is Lockheed's use of a flash back target instead of a collimator.

It was concluded that the difficulty in the Lockheed system is getting accurate route answers.

A common complaint about optics generally was that they do not help just out an distance measurement based on the above paragraphs tell of approaches claim to the problems by many different. One other solution and to be in the works is a process that take hold under constant tension.

► **The Tossing View**—Here are some comments by tossing people present at the Air Force demonstrations.

Lothar Pollack, teaching assistant at North American, said, "We're really just observing today. Optics is brand new to us. If [the Republic system] certainly gives a good reliable baseline, it seems ideal for ages like the F-01 and bigger. But the Universal Optical Positioner is just one way to work in

Perfetti went on to say that the message the manufacturers will remember is adopting optical tooling is the cost. He pointed out the Air Force is not going to allow any more money for optical tooling. Therefore any system of optical tooling must be competitive as costs. "Nobody wants to spend more for tooling than he has to. You can't sell tools."

Another North American spokesman said his company "was not ready to condemn the Republic system as the ultimate in tooling."

A representative from McDonald said that on a new contract he was now in building two separate sets of tacking, one for optics and one camera based so as not to hold up production.

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Quartz and steel nozzle assemblies for jet aircraft engines. ABOVE: main CP assembly. ABOVE, RIGHT: fuel nozzle assembly. TO RIGHT: fuel flow nozzle assembly. All Ex-Cell-O items have been manufactured and assembled by Ex-Cell-O to the strict specifications of the aircraft industry.

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Stinson said the 1992 models are the last aircraft to employ the APU. ABOVE: service tip assembly. ABOVE RIGHT: fuselage nozzle assembly. TO RIGHT: the flow nozzle assembly. All details of these units have been manufactured and assembled by Ex-Cell-O to the tight specifications of the original designers.

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Equipment will come from Eagle.

Tooling engineers in Boeing, Seattle, are authorized to draw the set of optics for all production rather than merely for experimental alignment of wing pitting rig as at Wichita.

Boeing, Lockheed, and Douglas are all bearing optical equipment to build the B-47.

A tooling engineer who asked not to be quoted said he was in favor of optical tooling but was unable to "talk the boss out of it."

Frank Woods—Comment was quite outspoken on the Republic rig with clamp-type cuttings: "Too high off the floor," "It's not well-sheltered," and "It's too big." Another tooling representative said, "The Germans used clamps because they didn't have the pins to cut up, but we do and we aren't ready to adapt the cutting system yet."

People who answered the AMC questionnaire weren't quite so laudal. And there was additional plumbage for the Republic system, too. Several engineers thought the Republic system goes farthest in combining a free and a single and holding it in space.

Republic Dies—The possibilities of optical tooling to set up repair rigs for damaged skin recently was advanced by William Collins of the Southwest Air Material Area, Collins and SAMA had had trouble holding to the fast-time tolerances required for stressed skin repair. He noted that when the specifications are too strict and one degree wash out, you have to let it at the shop won't fly.

He gave an example. Recently SAMA got a damaged B-47 wing. The repair shop took all the time, section by section, straightened it on a Galley, holding to 0.01 plus or minus. When it was finally put together it was twisted and not launch in any dimension. No pilot would fly it. Collins said they could have saved tomorrow if the repair rig had been optically aligned.

Collins said he was the need for an optical tooling structure which can be set up as a repair rig in two working days.

He pointed out, too, that whereas manufacturers wouldn't allow production tolerances to repeat wings, they or the manufacturing department could set up a repair rig to using optical tooling.

Optical tooling was also put forth as a valuable aid in accurate Peterson rubber requires dimensional tolerances in alignment which would be added by optical tooling.

AMC Questionnaire—Though response was weak to the AMC questionnaire on clamp-type fixtures and optical tooling, a summary of the reaction might prove interesting.

Nearly everyone agreed that past experience has shown the need for design-

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ing system which are easily moved around.

- On the assembly to clamp type fixtures, the members were divided into very adequate working area, yet 22, no 3, manual screw to parts in fixture, yet 24, no 7, allow for normal removal of assembly, yet 25, no 2.
- Severities and dimensions and other information received to date satisfied them on the rigidity of the fixture workpiece, eleven and they were not needed.
- The majority answering the questions were they thought clamp fixtures had potential value in experimental, repair, or small quantity production.

Only a few saw out of clamp fixtures in medium production (up to 50 applications a month). Not one saw a potential use for clamp fixtures in large production (over 50 applications a month). All questions were based on the workshop that fixtures were readily available.

- On the new value of pipe and castings when small models change, 16 reported the most value high, 7 medium, 4 low.
- Viewers and they were planning optical applications to looking at the following model number: F2H-3, F-46, F-34, B-35, F2V, B-47, F-94, and T-33.
- They saw no use or dimensioned fixtures.

Model B-2 Bomber of the type used by Billy Mitchell to sink the battleships off the Virginia Capes in the early '30's.

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new materials exposed by optical equipment, and the new view through small cameras held was 75 ft. Other limitations on future use cited were the power of optics and size of target.

- Only one person thought present experience with optical and radar systems could be completely abandoned. The majority thought they could be partially eliminated. One commented that there will always be applications for masters.
- Another comment was that small fixtures are easier to set up by conventional methods. Another thought optical tooling would not thought longer lives.

Kentelovitz also had it pays to invest time to make small master tools. But he stressed that the optical system master should be used to check and maintain and reproduce master.

- A majority, 17, thought that the present use of optics would not eliminate the use of master patterns, patterns, or drawings, some thought optics might eliminate their use about 20 percent.
- The answers were more equally divided on the relative costs of systems versus optics on three hypothetical projects: 1. to set hole patterns of wing parts, 2. small inspection covers and doors, and 3. bridge and wing attach angle both joints.
- There was even division on whether forming lines in a drawing features of optical systems is relatively high or low. One comment was that high-contrast tool designers can pick it up first. The majority felt that lower skills could not be used effectively on fixtures using pointing optics.
- The last question ANEC asked was which places it should explore in future development of aircraft tooling. Answers were construction of smaller, currently standard gauges, interchangeability, substitutes for local measurement, standard terminology, for one-time spot setting, methods for forming theories.
- Smallest Detail—The extent of the present in applications of optical tooling was evidenced in the attention to such details as the low melting point materials used to mount fixture which are parts. (Reversible steel Cerro metal or Carborundum). Kentelovitz suggested removing a tube from the melting jet to the coatings to be fixed to use trouble to dipping from the melting jet. But McDermott, chief tooling engineer, Brookings, doesn't think it will work. If the metal were the best but it will freeze up and block. McDermott is using a new jet with a jetcoat and is going to put heat on the jetcoat. Kentelovitz said there was a question how Carborundum would stand up, but McDermott expects it is standing up very well.
- Some have savings reported on optical tooling were three.
- Donny Liggett said by using optics to align jigs it can save 2,500 hours on

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THERMOCOUPLE TYPE

All LEWIS thermocouple indicators are fully cold-and compensated, magnetically shielded and are available for use with iron-constantan, copper-constantan, or chromel-alumel thermocouples in all standard ranges for the thermocouple material used. A few typical ranges are listed below.

MODEL 176, 28" case in ANS 10493	MODEL 178
-20 to +250°C Cylindrical Temp.	-20 to +250°C Cylindrical Temp.
(AN 555A or TIA)	(AN 555A or TIA)
-20 to +250°C Drying Temp.	-20 to +250°C Drying Temp.
0 to +1800°C Exhaust Temp.	0 to +1800°C Exhaust Temp.
MODEL 178, 18" case in ANS 10493	MODEL 416
-20 to +250°C Cylindrical Temp.	-20 to +250°C Cylindrical Temp.
0 to +1800°C Exhaust Temp.	0 to +1800°C Exhaust Temp.
MODEL 708, 28" case in ANS 10493	MODEL 710
-20 to +250°C Cylindrical Temp.	-20 to +250°C Cylindrical Temp.
(AN 555A or TIA)	(AN 555A or TIA)
-20 to +250°C Drying Temp.	-20 to +250°C Drying Temp.
0 to +1800°C Exhaust Temp.	0 to +1800°C Exhaust Temp.

RESISTANCE TYPE

Accurate resistors, these LEWIS resistance indicators are remarkably free of drift error, have nearly linear scales (not crowded at the ends) and are magnetically shielded. A few typical ranges are given below. Not shown is Model 46B, 2 1/4" style.

MODEL 416, 18" case in ANS 10493	MODEL 710, 28" case in ANS 10493
-20 to +250°C AN 555A or AN 555B	-20 to +250°C AN 555A or AN 555B
0 to +1800°C Exhaust Temp.	0 to +1800°C Exhaust Temp.
-20 to +250°C Drying Temp.	-20 to +250°C Drying Temp.
MODEL 710, 28" case in ANS 10493	MODEL 416, 18" case in ANS 10493
-20 to +250°C AN 555A or AN 555B	-20 to +250°C AN 555A or AN 555B
0 to +1800°C Exhaust Temp.	0 to +1800°C Exhaust Temp.

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a job that would ordinarily take 4,500 to 5,000 hours.

Lockheed reported it used only 87 hours to locate two torn bars by the optical and auto-reflection method. On an identical job, 140 hours were spent looking by conventional methods. Then does not give a true picture, however, because considerable turning time is included. Lockheed set the second bar in 24 hours.

► **AIA Standards**—After the fact-day conference, the optical testing panel of the manufacturing methods committee of the Aircraft Industries Assn. met and adopted some screening standards to be used in optical looking. The panel agreed to investigate further such aspects of optical looking as detector, measuring equipment and auto reflection.

Western members of AIA had previously agreed to go in the same direction on optical looking, and at this meeting the eastern representatives agreed to follow the same standards.

They standardized on three minimum accuracy only, the diameter of the target and the outside diameter of the telescope. This is so they can interchange parts. For example, if Boeing used Douglas a jig which was designed optically Douglas could put its own telescope on the same position on the jig and align.

AIA members by an action agreed to say nothing of optical looking. They intend to keep ingenuity and flexibility in development.

Boeing, Northrop, Chance-Vought, General, Republic, Lockheed, Martin, North American, and Douglas were represented on the panel. Charles Glasgow, chief testing engineer of Douglas, was chairman.

► **Reasonably Times**—The aerial reconnaissance demonstration at Maywood went as scheduled. A summary of tests is contained on the Lockheed F-94 and the North American F-86-D structure was.

	North	Lockheed
Design time	940	1822
Development time	2150	3937
Breakdown and		
skidding	31	50
Reassembly	28	77

These are development hours. The figures would be substantially reduced by complete familiarization of personnel with the Republic method of fixture construction. Reasonably hours might be increased, however. For one sort of complexity, a tolerance of plus or minus .010 was held in the device structure. (Accuracy depends on test use as setting up, and test visual.)

By using greater care, a tolerance of plus or minus .001 and it would as greatly can be held.

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AVIONICS

Design Trends in Buried Antennas

With more and more avionics using more and more antennas, engineers devise intriguing installations.

Rapid increases in the amount of airborne avionics equipment have produced many changes in the appearance of last aircraft since the second World War. The first tendency was to "Christmas-tree" the fuselage by hanging antennas externally wherever space could be found.

But jet aircraft speeds exposed new structural loadings on external antennas, so by nothing of the overall configuration drag increase. More and more, designers began searching for ways to install stronger, lower-drag antennas.

They found the answer in the sub-surface (or appressed) antenna, where the critical loading or recovery surface is isolated within the contour of the aircraft. Progress in this new antenna design field has been rapid. And some of the advances were told recently at the second avionics electronics conference at the Institute of Radio Engineers.

Following is a roundup of some of the significant points made by several authors in papers presented at the conference. Taken together, they present a basic approach to the understanding and practice of subsurface antenna design.

• **Basic Two-Avionics systems** in aircraft have three basic duties to perform. These can be subdivided further by definition and function.

• **Communications.** These are two sub-groups: local, long-range (ground) and wide range (remote). Long range communications are generally of the surface-ground type, short range are surface-to-air, such as in cockpit conversations, or as frequency, such as in ground-controlled intercoms.

• **Navigational.** There are two sub-groups here also, instrument reference system and target reference systems. The former is generally a long-range navigation aid of moderate accuracy, such as Loran. The latter is short-range, precision systems typified by beam-riding radio or target beacon systems.

• **Target acquisition.** This heading would include all systems which locate and vector the aircraft to a specific target such as its enemy plane or a friendly aircraft enemy.

• **Frequency Range.** The frequency range for systems which has been developed in the classes above varies from 30 kc/s to 10,000 mc/s. For convenience, this entire spectrum is divided

into low, medium-high and ultra-high frequencies. This division, incidentally, is not a standard one in which the band width is divided by "x" cycles at the low end and "y" cycles at the high end. Rather, it makes the division by a comparison of the dimensions of the reference and the wavelength.

In this manner, low frequency covers the range where the antenna's physical dimensions are small compared to the operating wavelength. At medium-high frequencies, wavelengths and antenna dimensions are comparable. And at ultra-high frequencies, antenna dimensions are large compared with the operating wavelength.

• **Low Frequency.** The primary use of low frequency systems is found in an intermediate and long-distance navigation aids. Loran, radio range and approach radio compass. Vertical polarization is essential and to avoid the large ground reflection losses to horizontally polarized fields.

Such vertically polarized, low-frequency transmitters give strong ground wave signals out to distances of several hundred miles. These in the downward direction are trapped in the stratosphere, the stratospheric duct level is high at these frequencies.

The magnitude of the noise level due to atmospheric static is such that increasing the effective height of a receiving antenna does not improve the signal-to-noise ratio. This implies that a short antenna gives performance about equivalent to a very long one in typical cases, whereas lengths of one or two meters are sufficient.

• **Medium, low frequency antennas** in duct like an atmospheric duct. Consequently, the design problem becomes one of getting the proper orientation of the antenna pattern so that an effective useful length component is obtained for vertical polarization.

In the case of the trailing wire antenna, for example, the drag of the wire causes it to trail at a very small angle with the horizon at current flight speeds. At 500 knots, the angle is about half less than 4 deg. This means that the standard Air Force trailing antenna of 200 ft length shows an effective height in vertical polarization of only about two meters.

• **MBF Problems.** This band is taken to be from about 1 to 24 mc/s for typical aircraft. One characteristic of



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and so it is anticipated that the signal-
transmission rates will be equivalent to
other locations on the airplane. In addi-
tion, the fan cap has been treated with
a non-etching paint to prevent changing
of the plate with respect to the air-
craft.

► **Wing-Tip Antenna**—One of North
American's jet fighters (presently a
modified F-50) was the subject of a
development program which centered
on nonmechanical wing antenna built
into the left wing tip. Some previous
flight tests on a light plane had shown
that such an antenna provided adequate
reception and was less susceptible to
graffiti attack.

Of course, the antenna had to be
light in weight and have assembly and
disassembly techniques adaptable to pro-
duction. A further requirement was
that the design be such that the antenna
could be assembled on a hot line with
out post-assembly having adjustments.

A radiating pattern study was made,
using a van with scale model of the
plane. Model was made of wood, with
an endcoat of zinc sprayed on. The
body coat was copper.

This model study showed that the
radiation pattern, subsequently, a full-scale
mockup of the left wing was built. The
mockup extended about 14 wavelengths
from the antenna. It was made of wood
beams covered with three ply with
shelved joints.

Numerous models of a shunted ele-
ment were investigated, being, flat
shy and flat stock wire among those
tried. The final choice was a flat strip
of 34 50 aluminum alloy. A plastic
support was used near the air end of
the radiating element, and the capacity
loading of this support and the Phil-
lips air made it possible to shorten the
antenna several inches.

► **Drop-In Antenna**—Another installa-
tion of a shunted antenna on a North
American jet fighter was developed
around a glass-pipe antenna. Develop-
ment was made of a cavity antenna in-
serted in the leading edge of the air
inlet lower lip.

Some design requirements of weight,
flexibility and no post-assembly im-
pinge, bid for this antenna as for the
wing-tip antenna. And again, model
and full-scale tests were made along the
development road.

Experimentation steps in the antenna
design were made which included the
simulation of a half-cylinder cavity
resonator and one semi-circular shaped.
After experiments with these, our pro-
totype antenna was constructed, which
was found to be very similar in electrical
properties to the developed experimental
antenna.

After the cavity antenna has been
mounted in the lip, a Plexiglas cover is
glued over the cavity opening and



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America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

Merely by broad brush strokes, we can all visualize this miracle. Remember the crystal set, the hand-cranked car, the biplane? A far cry from our FM radio, television, hydro-matic drive and supersonic planes.

And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and telescope... and to atomic energy and its untold possibilities.

- ★ Since 1900 we have increased our supply of machine power 5% times.
- ★ Since 1900 we have more than doubled the output each of us produces for every hour we work.
- ★ Since 1900 we have increased our annual income from less than \$2400 per household to about \$4000 (in dollars of the same purchasing power), yet...
- ★ Since 1900 we have cut 15 hours from our average work week—equivalent to two present average workdays.

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instead to the skin of the aircraft. This cover has a slight capacity shearing effect, and the prototype antenna was designed for best results with a Fiberglas cover in stock.

The final model of the glide path cover and Fiberglass cover was built by NAA using aircraft production techniques. The cover is a welded joint, and is sprayed with Gaco compound to assure erosion of the surface.

These typical examples represent our everyday thinking and practice in the field of antenna design for high-speed aircraft. Such advanced craft as the de Havilland Comet and the Avro Jetliner have completely suppressed antenna systems. And, these kinds of antennas will become more and more familiar to the aircraft designer as airplane speeds go higher and as aviation equipment increases in scope and value.

The above report is based on a group of papers presented at the annual meeting of the American Association of the Institute of Radio Engineers recently held at Dayton, Ohio. Included in the group was:

"System Considerations in Aircraft Antenna Design," by John V. N. Gossens, "Vertical Radiation Antenna System for Multiple Operation," by R. DeLano, J. T. Schulte, A. R. Ellis and D. S. Scheraga, "Jet Gun Gun Dog Antenna System," by Gould Wintrop.

"A Wing Tip Omnidirectional Range Antenna for a Jet Fighter Aircraft," by James D. Martin, "A Glide Path Cover Antenna for a Jet Fighter Aircraft," by Louis E. Roberts.

Fault-Finder Spots Electrical Defects

A V. Rex Canada Ltd.'s Jetliner will be equipped with a fault analyzer for spotting defects in the craft's electrical system.

When a fault occurs in an aircraft system it is usually difficult to determine whether it is due to an over load, oversaturation in voltage failure. Frequently the results in a system being overloaded off when only a minor fault has occurred and has not rendered it irreparable.

With the built-in analyzer the flight engineer or ground crew can quickly spot the nature and location of the fault, assess its significance and take measures to isolate or repair the defect or ignore it, in conditions of emergency.

Arrangement of the analyzer includes a group of warning lamps on the flight engineer's panel, each lamp indicating the nature of the fault and in which phase of the alternator it has occurred.

If the voltage drops suddenly in one of the circuits, it causes de-energization of a relay connected from the affected phase line to ground. This causes a set of contacts to close, lighting the appropriate light.

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SPRAY EQUIPMENT which, among full type of wing, gives maximum distribution. During operation will fit behind engine.

Agricultural Plane Shows Unique Features

CAA-sponsored craft is being widely demonstrated in huge manufacturers will adopt its patent-free devices.

Manufacturers and agricultural groups are now getting a chance to evaluate the new Ag-I prototype "flying tractor." This is the first plane ever designed and built exclusively for agricultural and forest crop control flying.

Civil Aeronautics Administration, which sponsored its development, hopes to get manufacturers to build at least part of the second version of the plane into a model of their own. There are no patents on the design features of the plane, and manufacturers are urged to let say so all data show it.

CAA paid \$10,000 to TWA & M Personnel Aircraft Research Center to design and build the plane, in response

to industry and flying farmer demand.

Outstanding characteristics, observed at a recent Washington demonstration before government and industry officials, were its extensive safety, pilot visibility, controllability and firm utility.

Safety First—Outstanding feature of the Ag-I is bedrock safety at every angle. It is a flying padded cell, minutely speaking. Unlike a cell, though, the cockpit of the plane gives unobstructed visibility in every direction—especially forward, where it counts most. Collisions with objects accounted for over half the fatal aviation accidents last year (see table, p. 47).

And slow-flight control built into the

plane with full-wing length dotted flap and slat-like wheels is another big inherent safety factor. Stalls accounted for 15 of the total 45 fatal disaster accidents last year.

Pilot's Protection—Structural safety features include adjustable pilot seat that will stand a 40G shock. Shockless harness and lower the pilot free to lean forward while working, yet at the start of a negative acceleration fastening a crash air impact gasket web in on the shoulder harness so the pilot's body will not fly forward and strike part of the cockpit.

The plane's nose is long and is sheltered by natural and external housing. Guide tubes over the cockpit will pass a phone wire over the pilot's head, and a cable stretched down cockpit even bar to the top of the vertical fin will pass



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Agricultural Plane Accidents

(Injuries and Deaths, 1949-1955)

COLLECTIONS	1949	1955
Wings, Poles		
Fatal	10	10
Serious	9	12
Minor/None	61	14
Traps		
Fatal	12	6
Serious	6	4
Minor/None	40	24
Buildings		
Fatal	1	3
Serious	1	3
Minor/None	9	4
Power		
Fatal	1	1
Serious	1	2
Minor/None	17	21
Other Objects		
Fatal	4	3
Serious	3	4
Minor/None	40	16
Stall in Air		
Fatal	15	14
Serious	17	15
Minor/None	14	40
Other Type Mishaps		
Fatal	4	3
Serious	12	8
Minor/None	219	97
GRAND TOTAL		
Fatal	45	16
Serious	47	40
Minor/None	341	287

SOURCE: CAA's statistical analysis

Aircraft Damage in Crop Control

	1949	1955
Destroyed	161	218
Substantially Damaged	165	237
Minor/None	1	2
TOTAL	327	457

● Grand totals show two more in damage than in 1949 and 1955 in damage classification than in 1949. This is due to the fact that the CAA's statistical analysis of aircraft damage is more complete.

the plane will still without its ceiling the sky.
● Visibility: The pilot of the AG 1 sits high in an open cockpit. He sees almost

west in all directions except through the wings. The cockpit facing is as solid as his head, so he can comfortably look back to his field before making his turn to return for another pass.

So specialized is this plane to favor of visibility, that the open cockpit is really for two ages for comfortable cross-country flight. CAA's P. W. Worth, aircraft division chief, C. W. Von Rosenberg, head of engineering, say the wing while hanging, the plane from Texas to Washington for the demonstration.
● Controlability: Pilot Von Rosenberg, told Aviation Week that the AG 1 handles beautifully at speeds right down to the stall, flaps up or down. Still it around 15,400 mph. CAA and other pilots have put it through all "qualitative" evaluations—still, turn, etc.—but have not yet done numerical factoring on rate of climb, gross load and maneuver length requirements, and other detail operation statistics.

These will come after the current generation and evaluation from CAA. Lieutenant C. F. Isaac says no positions are for early certification of the plane after the test. The test will continue about as long as groups will, as in CAA will send it anywhere within reason.

The full flap sets also as an obstacle. And when flaps are down, the pilot's vision takes from control over lateral control. Rosenberg says he has flown the plane with flap sets when they were stationary and had almost too much control. The flap sets, when up, act as a spoiler of lift over the high lift flap.

● Power: Visibility—This plane probably has the biggest wing in use. It holds the spray tanks and equipment—and provides exceptionally high lift at low speed. Spraying systems is thus built right in along whole length of wings, giving maximum distribution. The previous one flying but not yet had its spray tanks during equipment installed. That goes in the necessary action, he had the engine and its fuel in the pilot.

All metal construction means long life without hanging, maximum airframe maintenance, and safety. Fuel safety is built into the plane in every possible way the designer could do it. That was a principal aim. Safety, visibility and controlability are vital to this utility.

● SmallFuel Performance: While CAA has not yet made accurate measurements of bleed distance required, the plane was designed for takeoff of 1,100 ft. Von Rosenberg says the plane seems to make it in about 1,300 ft. with no wind.

Some observers at the Washington demonstration commented that more power would not be used. Present unit



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In Kerosene or Gas, it's performance that counts! And Silicone Rubber is recognized around the world for the production of custom silicone rubber parts, engineered for assured performance.

These Silicone parts are used in jet engines, aircraft bodies and instruments as well as in transformers, marine equipment, chemical and electronic apparatus, electrical appliances, etc.

Only Silicone rubber parts retain their physical, chemical and deflection properties at temperatures from -170 to more than 500 degrees F. In addition, they feature excellent resistance to many chemicals, weathering, oxidation, moisture, ozone and other degrading factors.

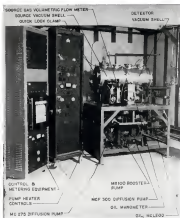
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SUPERALTIMONAUTICS, high altitude flow phenomena, is studied in the "windtunnel".

New Way to Study Altitude Flow

A new supercritical windtunnel installed at explains the properties of flow at simulated altitudes of 50 to 300 miles less goes into operation at the Berkeley campus of the University of California.

The new test device uses a molecular beam similar to the type used in nuclear research. Speed simulation to date has been limited to a low supersonic value, although greater capabilities have been demonstrated.

Funds from the Office of Naval Research and the Office of Air Research were used to build the tunnel, which was designed to extend the range of the university's low pressure, supersonic windtunnel, the world's first to be capable of test conditions simulating as high as a 70-mi. altitude.

The main component of the "tunnel" is a stainless steel tube about five feet long and 18 inches diameter. Auxiliary pumps and instruments complete the apparatus.

By Definition — Supercritical

flow occur at extreme altitudes—of the order of 100 miles—where the air density is very low and the molecular mean free path is large.

The molecular mean free path is the average distance traveled by any molecule between collisions with other molecules. At sea level, standard conditions, the mean free path is about three millionths of an in., at an altitude of 50 miles, the free path is about 10 ft.

As it happens, an altitude of about 70 miles marks the lower limit of the appearance of supercritical flow; at the 100 mile level, almost any vehicle would be in such flow. A further conclusion is that the flight Mach number must be greater than the flight Reynolds number. However, there is no reason why the Mach number couldn't be less than one, in other words, there can be subsonic supercritical flow.

For flight in the regime, the vehicle may be considered to be flying against a molecular beam, in which the effect of collisions between air molecules can



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• From pistons to turbines—we continue to advance with the aviation industry. Our production includes substantial commitments for Gear Box Assemblies, Auxiliary Drives, Hydraulic Gear Box Drive Assemblies, and Gear Assemblies for J-47 Jet Engines.

With facilities that produced thousands of reciprocating engines in World War II, we are now manufacturing our own engines, airframe and landing gear components for the military services.



JACOBS
AIRCRAFT ENGINE COMPANY
POTTSTOWN, PENNSYLVANIA

TEMCO Rated High in Quality Control

All Production Processes, Testing Methods and Laboratories Have Top Rating

Direct administration of Quality Control has played an important part in TEMCO's progress in the engineering and manufacture of aircraft. The procedures, methods, and equipment used at TEMCO are all recognized by the Navy and Air Force, certified by the Government, as licensed by the Civil Aeronautics Administration. Above everything else, the men who use these procedures, methods and equipment, possess the one quality for which there is no substitute—experience. Of all the men now employed in the TEMCO Inspection department, more than 41 percent have from 7 to 25 years actual aircraft inspection experience to their credit, while another 50 percent have from 5 to 7 years.

Quality Control Starts With Men in Shop

Along the wall of a TEMCO Production Superintendent's office is a sign which reads:

"Quality Must Be Built Into a Product—It Can't Be Inspected Into It"

These words could well be called the motto of TEMCO's production departments, for the men in the TEMCO shop know that it is in the machine, the riveter, the installer, the assembler and the man on the sheet metal benches—who are responsible for the ultimate quality of TEMCO products—not the inspectors.

To them men the inspector is important not as a source of quality, but as a guarantee that each part and assembly has the quality which only they—the men who built it—can put into it.

TEMCO Building Major Assemblies for Martin

Work is getting under way at TEMCO as major assemblies for the P3M-1 Martin Flying Boat manufactured by the Glenn L. Martin Company of Baltimore, Md. The Martin is one of the Navy's most modern patrol bombers, a successor to the P3M series used famous during World War II.

TEMCO

ENGINEERS AND MANUFACTURERS
FOR THE AIRCRAFT INDUSTRY



From Receiving to Flyaway

From the time the raw stock entered the TEMCO plant to final flight test as part of a completed airplane, this one forging benefited from eleven different inspections—Receiving, X-ray, Tooling, Machine Shop, Heat Treating, Processing, Paint, Installation, and Final Acceptance by Flight Testing.

Performing the inspections on this one part were inspectors whose cumulative aircraft experience totals 118 years or 245,440 man-hours.

This is not an exception, but a typical example of the strict inspection procedures applied by TEMCO, and the experience which TEMCO has available to insure their proper application.



Texas Engineering and Manufacturing Co., Inc.
DALLAS, TEXAS

be neglected. These molasses tend to cause seal leakage when very seldom are given to collisions between the molecules and the seal body.

► Tunnel Action—The supercritical stream whirls and acts much like a gas being molecularly heated.

The stream of molecules is fed into an evacuated chamber from a small bar size which has an opening at one end. The nozzle velocity is determined by the temperature of the filament, at 1,500K, the speed is 1,000 mph.

A system of slit controls and focuses the molecular beam to strike against mold surfaces in the chamber.

Elasticity in the low-density level compressible to certified atmosphere takes a week of continuous operation of a three-stage pumping system. Part of the long pumping cycle is attributed to the properties of an molecules in the seal parts of the tunnel. This reason also accounts for the spectra of rubber in a gasket material, rubber less up to 10 percent of its volume when placed in a vacuum system.

Spread and complex problems in instrumentation are introduced by the operation of a windtunnel where work may present a one in a millionths of an inch pressure. In order to detect pressure differences in such a low density medium, very sensitive gauges must be used. One electronic detector gauge developed at the present can measure pressure changes of one sea inch of a sea level standard atmosphere.

► Slightly Supersonic—So far, the tunnel operational speed has been only slightly supersonic—970 mph is the quoted speed. But it has been demonstrated that speeds of 1,500 mph can be attained, and the upper range of speed is only limited by the temperature that the motor chamber can stand.

The work of developing this new tool was directed by Prof. R. G. Felson, professor of mechanical engineering, S. A. Safford and pool of engineering science, and G. F. Malsack, supervising engineer. Construction and operation of the tunnel was under the operation of P. C. Hefner, physicist.

Power for Starting

AdResearch Mfg. Co.'s 140-hp low-pressure air starter starts its air-cylinder completed Air Force cycling tests.

Reported to be the most powerful air starter ever developed, the 13.5-in. unit is said to have enough muscle to turn over turboprops in the 10,000-hp thrust class and turbojets in the 5,000-hp category.

AdResearch says that at the end of the testing trial—estimated as the equivalent of six months of service on an operational aircraft—inspector output has dropped less than 1 percent.

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<input type="checkbox"/> OXYGEN REGULATORS O-10-A			<input type="checkbox"/> VACUUM PUMPS V-100-B
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--	---	--

ARO Engineers "were in touch" before World War II... designing and building precision instruments and devices widely used in aircraft.

Today—ARO's years of experience and modern facilities are important to users of aircraft products such as these. Whether it's oxygen regulators... vacuum pumps... check valves... or other units... ARO builds "on right for precision and performance" Read for complete information: The Aero Equipment Corporation, Dept. 404.

AIRCRAFT PRODUCTS

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EQUIPMENT



FLAME shoots out more than ten feet when standard hydraulic fluid is fed under pressure into hose of explosive torch at right.



NO FLAME results when new hydraulic fluid H-2 is forced under same conditions into same torch. Navy now is using the fluid.

The Hydraulic Fluid That Will NOT Burn

Hollingshead's H-2, being adopted by Navy, is rated by CAA with Flammability Reference Number of 0.

By George L. Chavakis

Camden, N. J.—A non-flammable hydraulic fluid that can be sprayed under high pressure into the 6,350 deg. zone of an explosive torch without catching fire has been developed by R. M. Hollingshead Corp., and will be used in the hydraulic system of every airplane the Navy owns in significant quantities. Why this new flameless fluid, which also has good lubricity and is non-cor-

rosive, is named H-2 and now is being made available for all commercial and military aircraft, says Frederick H. Lee, Jr., Hollingshead sales manager. "Will Not Burn"—Here a point at H-2's non-flammability. A Civil Aeronautics Administration test report states that when H-2 under 1,000 psi was sprayed through an oxyacetylene flame (temp. 6,350 deg. F.), no fire resulted. George W. Hollister, CAA's Chief, Aircraft Division, gives the fluid a Flammability

Reference Number of 0, based on tests by CAA Technical Development & Evaluation Center, Indianapolis. Practically quelling the fluid has no flash point! Even with all the water boiled off, flash point of the residue is 761 deg. F.

Navy planes now flying are having their hydraulic systems drained, flushed and filled with H-2. Almost all airframes for the Navy new in the production line will have these systems filled with H-2 as will most future Navy craft.

A significant advantage of H-2 is that it does not require changing synthetic rubber seals of leather backup rings, not of any other hydraulic system

The Most Trusted Skill on Earth...

Suppose for a moment that you found it necessary to choose a surgeon to perform an important operation on you or a member of your family—how would you select the one man in whom you could place such a trust? Is it probable you would arrive at your final decision only after a careful check of his background, his qualifications and professional experience. This same logic can be used as a guide to important decisions in other fields as well. A case in point is your selection of a source for the vital instruments and accessories used in your phone. Look at Eclipse-Pioneer's record in this field. It dates back to the arduous military's earliest days. Right from the beginning Eclipse-Pioneer has consistently demonstrated an ability to design and manufacture to both military and civil specifications, for experimental as well as operational applications. In addition, Eclipse-Pioneer inaugurated and maintains a system of quality controls as precise as they have become literally the standards by which the "standards" are checked. Now that is sound, it's worth remembering, for when you choose one like named above, you will mentally call on Eclipse-Pioneer.

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WESTERN UNION

L82-42 SYA71B SY.WEBO 16 NL PD
PORT WASHINGTON NY JUN 6 1951

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THANKS TO THE WONDERFUL PERFORMANCE OF YOUR L-2 AUTOPLOT, YOUR ADF-12 AUTOMATIC DIRECTION FINDER, AND YOUR VHF COMMUNICATIONS RADIO, MY FLIGHT OVER THE NORTH POLE WAS ESSENTIALLY NO DIFFERENT FROM ANY OTHER ROUTINE FLIGHT. I HAVE MADE EXCEPT THAT IT TOOK A LITTLE LONGER. THE L-2 TOOK CARE OF ALL THE CRUISING FLIGHTS AND THE ADF-12 WAS EXTREMELY HELPFUL IN THE NAVIGATION BY OBTAINING LONG DISTANCE RADIO BEARINGS FROM ALASKA. I HAVE OPERATED YOUR EQUIPMENT ON MY MUSTANG UP TO 30,000 FEET AND AT TEMPERATURES OF 70 DEGREES BELOW ZERO WITH UNIFORMLY EXCELLENT RESULTS. BEST REGARDS,

CHARLIE BLAIR

From New York via New York via the North Pole with only one stop for gas at Fairbanks, Alaska—4,500 miles in a Mustang F1B at an average speed of 300 miles per hour—that is the historic and daring achievement of Captain Charles E. Blair, the only man ever to make such a flight solo over the top of the world. In the Arctic region your magnetic compass is useless, so your radio direction finding aids and automatic plot become indispensable—particularly when you have to go it alone. Captain Blair, Senior Instructor pilot for Pan American World Airways and veteran of 408 Atlantic crossings, knew exactly what the

job called for. Naturally he chose Lear equipment throughout—and he was never as far from home as when he left ETN's on the entire flight.

Here is the Lear equipment installed by Captain Blair for his remarkable flight—all the way from New York to the North Pole and back in the space of 40 hours and 10 minutes.

- 1 Lear ADF-12 Automatic Direction Finder
- 1 Lear L-2 Automatic Plot
- 1 Lear Master Direction Indicator
- 1 Lear VHF Radio
- 1 Lear Medium Frequency Receiver
- 1 Lear (Optional) F1B Commuter
- 1 Lear Lear Frequency Converter
- 1 Lear Directional and Tracking Antenna Assembly

LEAR INC. YOUR WEST COAST OFFICE • 1400 AVENUE 40, GAITHERSBURG, CALIF.



Hydraulic Fluid

Some Properties of H-12 Non-Flammable Hydraulic Fluid
Approved under Specification MIL-F-7063 (AER)
See Navy (Navy) Tech. Order 13-51 for Procedures

Flammability: Non-flammable in a spray at liquid. Resistant to direct ignition, after brief exposure of water. Classified as Specification MIL-F-7063 (AER)
Flash: No flash, —761° F. of smoke.

Freezing: 10 hours @ 100° F.; Resistant to freezing, oily and not hard to break.

Rated Freezing Point: When subjected to a temperature of —60° F. for 6 hours in a laboratory recorder table under conditions of atmospheric pressure, the fluid shows no evidence of crystalline formation.

Low Temperature Stability: 100° F. for 72 hours. While opaque fluid

Viscosity: The component materials are so more viscous than water. Loss of viscosity of as much as 30% of H-12 will not cause perceptible operation or any undue change in the operation of the fluid.

Viscosity:		
@ 150° F.	—	30 Centistokes—Maximum
@ 100° F.	—	175 Centistokes—Maximum
@ 60° F.	—	2,300 Centistokes—Maximum

Shrinkage: No change in viscosity due to short breakdown

Specific Heat: At 50° F. in 100° F. Average is 0.30 BTU per lb. per °F.

Coefficient of Thermal Expansion: 0° F. to 70° F. average 0.00029

Expansion: 70° F. to 100° F. average 0.00030

ASTM Standard D 156-44 Method A: 0° F. to 210° F. average 0.00030

Yield: 100% Maximum: Color: Amber Clear

Weight per gal. @ 70° F.: 8.935 lbs.

Specific Gravity: 1.30 @ —1° F. 1.081 @ 60° F. 1.062 @ 120° F.

Package: Galvan and 50° F. Range: This may "F" range in package approved under MIL-F-7063. Rubber seal is not accompanied by deterioration or degradation.

Impaired elongation and break strength may be expected, as well as a decrease in friction.

components with the possible exception of ceramic films which might be assisted with a product which is a water-based fluid.

Airframe manufacturers whose Navy aircraft will carry H-12 are: Glenn-Vought, Convair, Douglas, Grumman, Lockheed, McDonnell, Cessna, L. Martin and North American.

► **No Conversion Problems:** Dr. Vito Esposito of Halliburton's New Product Development said that there was no problem in converting a plane equipped with ANO-506 fluid to H-12 because 506 is easily modified and finished out of a hydraulic system. Also, the two fluids are compatible in the ratio of 90 percent H-12 to 10 percent 506 (H-12 is also a water-based fluid which has now been superseded by H-12).

Esposito added that converting H-12 to hydraulic fluid is more difficult. Sludge in the form of metallic soaps which exist in H-12-coupled hydraulic system is so thoroughly covered off to remove carbon by the detergent action of H-12 that a very thorough job of flushing is necessary. And the filter must be changed and have to be changed.

Halliburton is concerned that H-12 will have strong appeal to commercial

operators. Its lubricity is as good as or superior to ANO-506, it offers no serious problems if properly handled, it has a high viscosity index and has operated well at temperatures below —60 deg., but no short breakdown, and above all, will not burn.

H-12 high specific heat means that the fluid will transfer heat from moving parts more efficiently than petroleum base fluids.

Cost is in the neighborhood of \$1.00 a gal., but this will be reduced with widespread use. One five-gallon fluid now being used with one cost up to \$12.00 a gal.

► **Development:** H-12 was developed by Halliburton with the close help and cooperation of the Naval Bureau of Aeronautics, Vought, Inc. was very helpful in providing pumps and other components used in testing the fluid. H-12 made up contains 35 percent water, 50 percent ethylene glycol and 15 percent base and inhibiting agents.

Water evaporation has been particularly concerned as a problem because of the hygroscopic nature of the fluid, which causes it to maintain any water that might have evaporated. The fluid product also includes additive materials to inhibit corrosion, both in

SIZE OF WEIGHT



NO PROBLEM FOR

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A single Flying Tiger plane takes any load up to 20,000 pounds... and Flying Tiger has 38 special air freight lanes, on multiple daily schedules, that carry anything from silverware to explosives. Instruments to helicopters.

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Cuts Cost In Half with SPEED NUTS®

EDISON specifies SPEED NUTS after cost comparisons reveal 50% savings over other military acceptable fastening methods.

• In the very earliest design stages of their aircraft fire detection relay panel, engineers at Thomas A. Edison, Incorporated, checked various methods of attaching connectors to the panel.

Their requirements were rigid. The fastening means had to be light in weight, resist vibration, fastening, provide quick and easy assembly, and be as low as cost. Tinnerman Aircraft Connector Mounting Rings proved to be the only fastener that qualified on all counts. Connections are quickly

loosened through these mounting rings and the panel.

As for cost, Tinnerman SPEED NUTS turned in the fastest record by far! Easily 50% assembly savings over acceptable military substitute fasteners were provided by faster, easier, better SPEED NUTS.

Complex or simple, solving fastening problems is Tinnerman's specialty. Now looking, "A Story of Quality," reveals how we can help you. Write for your copy. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6686, Cleveland 14, Ohio. In Canada: Dominion Electronic Ltd., Brampton, Distributors: Air Associates, Inc., Toronto, New Jersey.

TINNERMAN
Speed Nuts®

FASTEST THING IN FASTENINGS®

Flammability

Rating

Based on the Flammability Reference Scale

Fluid	Flammability Reference Number
Aviation Gasoline	50
160 Proof Brandy	72
Kerosene	75
Oil, Aircraft Engine	76
No. 2001	76
Oil, Aircraft Engine	76
No. 1120	88
Ucon 100-400 N	88
Ucon 10 PD 100 N	89
Tricresylphosphate	84
Synkyl	95
Tricresylphosphate	40
Boyd Vitrofluorolubricant	44
Monsanto Solutene-140	42
Monsanto Formolene	
No. 5	less than 30
Hexachlorobutadiene	0
Hydrotalc (H-4)	0
Hallgaholm H-1	0
R. P. 34 Hydraulic Fluid	0

FIGURE 1—A major characteristic of aviation gasolines is their low flash point. In comparison, the boiling point of kerosene is 300°F.

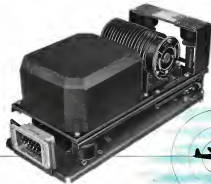
the liquid and vapor phase, and to deactivate carbon particles to break polymer reactions which would otherwise start in the metal-to-metal contact existing throughout the hydraulic system.

In spite of extensive and exhaustive laboratory testing, it was not until recently that Hallgaholm learned what H-2 would do under prolonged service conditions. To date it has been used in Navy AD aircraft for two years and FIVE for over one year. Last and not least, H-2 functioned perfectly in all respects, when proper fitting technique was used.

■ **What If's Like—**These are some of H-2 characteristics and handling requirements as determined by flight and ground tests:
• Water loss due to evaporation is less than one percent, in a squadron of Naval airplanes operating for more than one year. There is absolutely no oxidation up to 360 deg and loading point is 244 deg.

• Antioxidation and self-lubrication of synthetic rubbers "O" rings were not leached out as a result of continuous submergence in H-2. Being available in the fluid, they were not depressed but remained undisturbed on the surface of the "O" rings.

• To insure complete protection from corrosion, ground parts should be completely submerged in H-2. If this is not feasible, they should be filled with



NEW STANDARD D-C CONTROL PANEL BUILT TO USAF EXHIBIT No. MCREXE22-89A

Here is the new standard d-c control panel. This compact, lightweight panel embodies outstanding Westinghouse contributions to the regulation, control, protection and measurement of d-c aircraft systems.

Many of the built-in features are the result of successful use on other Westinghouse panel designs — your guarantee of performance-proven equipment.

The new panel is of the simple plug-in type with a voltage regulator which can be quickly inserted or removed. Vibration and shock resistance are built into the unit around the center of gravity.

Accurate generator interactivity in a multi-generator system provides hundreds of generator over-excitation during overvoltage and overload conditions. Special design in the field relay provides trip-free operation... both mechanically and electrically.

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day of turboprop power!

For the dynamic combination
of turboprop engines and Aeroprops
opens up a great and new area
where cargo ships, bombers and fighters
will fly at near- or super-sonic speeds.
And they'll fly with range and performance
that would have been only a dream—
a dream brought to life
on the drawing boards
of the men at Aeroproducts.



Aeroproducts turbine mounted on Allison T-38 engine.

Aeroproducts, working in close contact with the Navy and the Army, has pioneered jet-turbine designs for turboprop power... But, in its research and development experimental work, it has the aid of popular science magazine, Quest for all others to follow.



December, 1950—a dramatic reference to the development of turboprop power. For it was then that the Lockheed F-41 was flown, first, the first turboprop using turbo-jet power. And from these first came knowledge for the development of turboprop for new planes that achieve the jet's performance, the maximum thrust of the turbojet engine and turboprop combination—and an unswerving new standard of average performance.



AEROPRODUCTS DIVISION
GENERAL MOTORS CORPORATION
BAYTON, OHIO

*Building for today
Designing for tomorrow*

Aeroproducts



AN-07 (MIL-F-6891), dehydrated and played. Hollinghead chemicals are working on a storage fluid comparable to H-2 which will be available soon.

Case should be taken not to spill H-2 on dynamic pressure and hoses, the fluid being a fairly good joint sealant. If spilled fluid is wiped it should form a pealed surface within three to four hours, no damage will result. Painted areas can be protected with AN-L-37 lacquer.

Storage in one package provided fluid is kept in closed containers and is not subjected to unnecessarily high temperatures.

Flare solvents and dyes should not contain specific constituents such as lead. Such solvents would be dissolved and dispersed throughout the system by H-2, possibly clogging filter and increasing in the fuel feed which is dangerous to moving parts.

Precautions should be taken not to contaminate H-2 with volatile materials. Physical effects of such contamination in reducing the high dielectricity, physical stability, effectiveness of the anti-wear additive and, possibly, of the corrosion inhibitors.

Inorganic salts and/or acids which may be contained in further backings should cause no concern because of the minute quantities compared to the volume of fluid.

Numerous tests exposing a variety of electrical wire coatings and insulations to H-2 revealed that the fluid had no deleterious effect on the materials provided they were properly fabricated. Wiring unsuitably exposed to fluid should be vinyl coated.

Fluid used to clean parts exposed to H-2 should not be chlorinated hydrocarbons (carbon tetrachloride, trichloroethylene) which would undergo hydrolysis and generate serious corrosion. If parts have been cleaned with these or other chlorinated solvents, they must be examined to a 5 percent dilution and bath at 140 deg F. for 30 min. Stabilized Solvent P-561 should be used.

Other Products—Hollinghead produces a variety of products for the aviation industry. Among them: corrosion preventatives, anti-oxidant compounds, aircraft cleaning products, preventive coatings, elastomer polish, paint remover and color remover compounds. Mac-Lut is a polymerized aluminum filling material, has proved useful to fill out damaged leading edges.

Aviation related developments are now under intensive operation (ADD) funds for jet engines.

Hollinghead's New Products division, headed by A. E. Moxie, is credited with having led the work in the foundation of the jet era. Burnable hydraulic fluid, under the direction and guidance of Dr. Roberts.



PRESSURE SWITCHES

HELP MAKE TODAY'S AIRCRAFT

Safer Than Ever!

Greater safety for your planes is the goal of every Aerotec designed control. To cover every possible contingency, our instrument specialists have developed hundreds of different types of controls. Below are a few typical examples of Aerotec pressure switches covering a host of applications. Aerotec is supplying thousands of controls of these types to meet today's demands. They are playing an important part in raising the high standards of safety on commercial and military aircraft.



SENSITIVE LOW PRESSURE SWITCH SERIES PM-6

Differential Type for Rear Air
Sensitivity 1" H₂O
Adjustable Pressure Range 1.5" H₂O to 3 psi with differential of 25% of applied pressure.

Electrical Rating: 28 VDC 5 Amp, inductive
Compatible with A. E. environmental specifications 12500-0

For stall and flow warning applications and as safety switch for cabin de-icing systems.

PRESSURE SWITCHES SERIES M-300

Gage, Differential, Type
Adjustable Pressure Range 1.5 psi to 250 psi
Mechanism MIL Type, hydraulic
fluid, oil
Electrical Rating: 28 VDC 5 Amp,
inductive in 0.05 sec.
Compatible with A. E. environmental
specification 12500-0
Over 50 different types designed
and produced



HIGH PRESSURE SWITCHES SERIES T-100

Actuating Pressure Range 280 psi to 5000 psi
Mechanism MIL Type, oil, hydraulic fluid
Electrical Rating: 28 VDC 5 Amp, in
45,000 ft.
Temperature Range -40° F. to +150° F.
Proof Pressure up to 1500 psi

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- Nothing Touches the Ear
- Weights only 1.6 oz.

MONOSET *

- Doesn't Spread for Both Ears
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Why one airline kept job at home, and how it did the work.

A one record at one office that decided to do its own stripping and is scaling of DC-4 integral fuel tanks is furnished by Russell International Airway.

R. A. Flann, Russell Maintenance Engineer, has declined to Answer. When data concerning the problem and necessary operation which should serve as a model guide to other airlines faced with the same problem. Following are the most pertinent facts as outlined by Flann.

► Ground For Decision—Russell made its decision, involving its fleet of nine DC-4s, after getting bids from outside firms that would do the stripping. Two factors bearing on the airline's decision to do the job itself were: plane would not be released from base for three weeks, and "George Operations" work could be performed simultaneously with tank work. Also, although an intangible asset, types would be tested for future gas tank work.

Stripping compound chosen was Turco 25L2, (Aviation Week, June 5, 1954, p. 43). This material can be removed with water as cold water, is capable of being reused, is effective on most thick and thin N types of synthetic materials, and has very little dissolving action on synthetic rubber. It breaks the bond between oxidant and tank resulting in maximum stripper concentration and greater ease in removing oxidant residue from the tank.

Factors determining whether spray or H-20 and down methods of stripping would be used were:

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► Spray-on requires less material (about \$100 per plane) but more man hours. All materials used are expended.

► H-20 method requires approximately \$1,200 of material per plane for a fleet of nine. But, during the dwell time (nine tanks are filled during which the stripper does its work, personnel could be employed to do other work required by George Operations that is going on continuously.

Russell chose the H-20 method.

► How To Get Ready—Preparing a plane for stripping is a big job, according to Flann. Outer wing panels have to be removed, exterior lines disconnected, switches plugged. Tank access doors are removed with jigs and bolts and strapping the doors are removed. The latter operation makes away the stripper.

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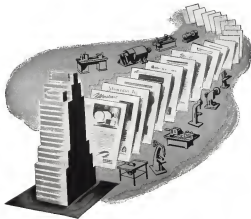
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stronger tanks and pressed through in less in the city dump, five miles about eight-and-a-half hours. Dwell time varies from 15 to 77 hrs. Air-driven impellers within the plow's tanks to agitate the sludge reduce dwell time and greatly improve stripping results.

Tank access doors, submerged in the sludge, are used as sealed seats to discontinue program stoppages or working in the tank. When they indicate that the job is done, tanks are quickly drained into storage tanks and wing tanks are rinsed with waste water. If all solvent is not removed, process is repeated until it is.

► **Stress-free structural repair.** In support of Bussell's extension that about 90 percent of a tank's total retention qualities are provided by its crust and other structural members. It shows the two-fold gain of permanent, fast tight joints and improved structural strength as the result of pool coating practice.

Installation of a new Douglas Aircraft door loading doubler and a low stress door caused a dramatic link path between doubler and skin at the door and eliminated the troublesome creaking (and subsequent delays) of existing doubler.

Final cleaning is accomplished with a liquid solvent leaving a low evaporation rate and application of a phosphorylation compound to slightly etch surfaces on which solvent is to be applied.

If the tanks are mechanically and chemically clean, working begins. To facilitate this job, Bussell removes all internal tank ladders.

The entire new Minnesota Mining and Manufacturing Co.'s EC-800 solvent, meticulously applied to all surfaces. Great care was taken to work all air pockets out of the EC-800. In contact with EC-875 to produce a foam decontaminant action of fuel. EC-875 also gives good protection against the possibility of corrosion.

But, prior to its application, tanks should be ground-blasted at 3.5 lb./sq. in. for 30 min. with no maximum depth to insure a perfectly leakproof tank.

► **What Is Cost-Benefit?** Bussell's cost for the whole job at \$11,000 per plane for ships refilled with wing tanks and \$15,000 for ships with out tanks.

Cost distribution is approximately outlined only for preparing the plane for stripping, plus actual stripping, structural work, and painting and testing the tanks.

Planes says that Bussell has currently finished three of its DC-4s. Since reworking, the planes have flown without any leaks being detected. Bussell feels that the investment made in reworking these tanks will certainly be money well spent towards a trouble free fleet of air craft.

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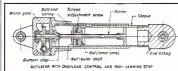
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A new type of non-jamming stop and overload control designed to prevent damage to electric mechanical actuators in event of limit switch failure has been developed by the Overload Control Co.

The control is a simple mechanical device integral with actuators constructed by the firm. It adds little to the overall weight of the actuator, according to the inventor. Patents are pending.

► **Split Nut**—Essentially, the safety device is an overriding mechanism (see drawing). It consists of a nut split into two independent outer shell and inner cone. These normally are locked together by spring-loaded ball bearings (housed in outer shell) pressing into detents in the inner cone. Outer shell of the nut is welded to actuator frame which supports the end fitting; inner cone of nut is threaded on the screw which is turned (via worm gear arrangement) by electric motor.

Normally, the complete nut moves back and forth loosely on the running screw, retracting or extending the screw to which it is attached. In either direction of movement, a limit switch normally stops the motor when full travel has been attained.

► **Limit Switch Failure**—This is what

happens if the limit switch fails. The electric motor continues to operate and turn the screw even though full travel has been reached. Searching has to "give" somewhere. Ordinarily, without a patent to "push her" for the limit switch, a pin would shear or other damage would occur. But in this case, the nut comes to the rescue. It hits the positive stop as the actuator (spiral) bumper soles the impact. The screw, still turning, scratches loose the inner cone of the nut by forcing ball bearings out of detents. Result: The electric motor continues to operate, turning the screw with the inner half of the nut. The outer half of the nut remains stationary and no damage occurs. Also, the actuator can be continued in use until the pin scratches the ground and the limit switch is repaired.

Reverse rotation of the screw causes the ball bearings to drop back into the detents and lock the nut together again. For normal operation. Spring-loading of the bearings can be adjusted so they release at the specific torque desired. The inner cone of the nut is hardened and polished to prevent wear. Address: 268 E. Longton Ave., Glen Oak, L. I., N. Y.



Small Potentiometer

A two-to-one precision potentiometer "originally" developed to overcome space and weight problems on

a guided missile," now has been placed on the market for other aviation applications by Hervey-Mey Laboratories.

The unit (measuring 70 cc.) has two motor sections and can be used where an exceedingly small mechanical force must be converted into two equivalent electrical voltages. With current carrying capacities up to 100 milliamperes, it provides two outputs sufficient to operate simultaneously controlling and sensing or indicating instruments without amplification. The company points out the latter feature makes possible substantial savings in cost, weight and complexity of such installations.

To learn particular details, the two motor sections in the potentiometer

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Future Looks Better for Nonskeds

Now they can get contracts to fly military personnel, and have found a champion in a Senate committee.

Two months have eased the thurst to 55 min scheduled airlines under business death sentence by Civil Aeronautics Board policy. If it sticks by its earlier policy, CAB will get them out of business one by one, as they come up for individual exceptions, if there have flown over three non-scheduled flights a month—and 95% percent of them have done so. The two events were:

- Defense Department informed all military transportation officers to contract with the nonskeds for official military travel.
- The Senate Small Business Committee Report urged CAB to listen, not bill, the nonsked industry.

Those two events followed another temporary reprieve for the nonskeds—a court injunction against CAB enforcement of a regulation that would have leveled all arriving nonskeds to three flights a month, in rule effect this month.

- SSB Tase to Do-But despite that does correct congressional use from the military, one from the Senate and one from the federal court—the nonsked airlines still are not scored at fair economic numbers even while now doing a business of close to \$160 million a year.

CAB in the past has declared it will revoke the letter of authorization of any airline that performed unsatisfactory operations—defined as more than three trips a month. But the Board's mem-

bers have changed since that policy first was announced.

Aviation Week cited one CAB Chairman Donald Noyce, who he thought of the Senate committee as port limboing the CAB. Noyce pointed out that, in the first place, he himself had not yet seen the final report, in the second place, how when he heard of the report it failed to point out CAB's problems, and, in the third place, the present fact that Civil Aeronautics Board is a different one from the one that set the three-trip-month limitation on nonsked operations.

Only two of the five main board were in on the original CAB policy issues too—Donald Ryan and Josh Lee. Chen was Noyce's old member Joseph Adams and Chas. Garney joined the Board later.

Ironically, in 1946 the nonsked airline industry was born with official sponsorship. CAB granted all non-scheduled airlines a license to operate. War Assets Administration asked them to buy war-surplus aircraft at low prices, Veterans Administration and the Reconstruction Finance Corp. made money available, and other administrative agencies helped. Under those government checks hundreds of new airlines popped up as business in "large corporate company".

- Nonsked Airlines—Last month and this, the nonscheduled airlines have been doing more business than ever be-

AIR TRANSPORT



fore, primarily for these two reasons: Soldiers on furlough, and the occasional rapid transport program in peacetime. As a result, the nonsked airlines have become a small and less attractive business. Business is so good now that many nonskeds want to buy more planes. But they can't raise cash. Basic war's lead a dash to a corner that CAB is officially committed to get out of business.

Air Coach Transport Association opened up furlough business for the nonskeds this spring after meeting twice the first of this year to get CAB acceptance. The Military Traffic Service of the Defense Department required that before it would permit nonskeds to have official representatives at military bases, along with scheduled airlines, bus and truck representatives.

The nonsked furlough operations were into high gear about a month ago, providing furloughed men with charter-type flights short to an airport near home and back to post again.

The Military Traffic Service told the nonskeds in effect: Do a good job on the furlough flights and we'll let you in on the official military travel.

In its first month of running furlough operations, the Air Coach Transport Association has already received special consideration and letters of thanks from transportation officers of the army camps. ACTA flights have served 30 now the nonskeds are going to contract for official military travel as well.

- Official Standing—Military orders have gone out to all local military transportation officers to contract official travel with the nonsked associations part as they have always done with the associations of the scheduled airlines, the airlines of the U.S. Air Force.

The airlines work only through the accredited associations to schedule and contract transportation—not through the individual companies. The Air Coach Transport Association was formed by the nonskeds less than a year ago. Association was formed by the international nonskeds, the Independent Military Air Transport Association (IMATA).

The two associations book military personnel for each other's member airlines. ACTA has regional divisions with offices at La Guardia Airport, New York; Miami International, Chicago, Jackson City, Ken. San Francisco and Honolulu. ACTA has about 25 member airlines, traffic representatives at various camps such as Fort of New York, Fort Dix, Camp Kilmer, Fort Dix, Fort Fort Monmouth in the New York area. Head office of ACTA is in Washington.

The members plan to reach more business growth ahead, especially military. ACTA is now sending telegrams to contact all airport offices. And the head office is moving into the

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The CAB critic also says "unfathomable" observers "believe that Jones would continue to exert the real authority as the company" although he is now not an official but a consultant to the new company president—Alfred L. Jones. **CAB Approves—CAB Chairman Donald Nyrup says Jones will not run Cal-South Airlines.**

Jones is returned at a fee of \$12,000. Company had wanted to keep him as an executive consultant to the president at \$24,000, but the CAB and "nothing doing" in other that title as that title. The Board later permitted but did not encourage the retaining of Jones as a nonofficial consultant at \$12,000 for the time being.

CAB can hold the whip hand over the Jones influence and Jones had to agree as long as Cal-South must go to CAB for each day.

Engine Pinch Seen Possible Next Year

Heavy demand from both military and airlines for new 2400 hp Pratt & Whitney R-2800 C-46 engines could cause a tight supply situation next year on production priorities for the Douglas DC-4B, Convair-Lear 240 and Martin 4-4.

But Pratt & Whitney Aircraft says airlines will start to delay in delivery of Nash Kellogg's latest production on schedule. That's because the engine has not been cleared yet. Says a P&W spokesman: "We think we are safely ahead of the demand for the engine for the next year, if all goes well, but maybe the airlines manufacturers will have some serious concerns."

Nash Kellogg plans to start R-2800 delivery of the line about July 1 next year—letting half-way by October. Pratt & Whitney says the timing will be critical, but having enough both military and airline aircraft production requirements for the engine will be filled on time. The expected supply pinch on the engine is partly due to recent military production orders for the Chase Mustang transport C-123, the new engine. Ranch pilot trainer T-36 and the Bell jet subsonic helicopter.

Scheduling Priority—It's a while next year, these are not enough engines to go around to all airline and military production schedules, here's what happens.

The Aircraft Production Resources Agency at Wright Field would look at its aircraft production list. That is a list showing what order of importance the military, Navy and AFRA attach to each aircraft order.

Perhaps a Convair-Lear and an Air Force Beech trainer also about next year. Then AFRA picks up the order. The point of view. Civil transports are officially designated as strong military assets. Maybe, just for example, the Beech trainer can wait a few weeks without losing an Air Force training schedule. Then Consolidated Vultee can keep the Convair-Lear rolling, and enough engines will reach Beech in time to meet the Air Force requirement, too.

U. S. Airlines Facing Management Change

A big shake-up in management and operations of U. S. Airlines will occur when and if present stockholders approve the financing plan for its vote at their meeting on Tuesday of this week.

Subject to stockholder approval, New York industrialist Charles R. Kipley will get 51 percent ownership of the company. Kipley's plan would divide the company into two parts: one to handle the airline business and the other to handle the aircraft business.

Agreement Reached—Agreement signed by the U. S. Airlines, Chairman and Kipley calls for Kipley to buy up to 1,000,000 shares of common stock of the company and buy 1,000,000 shares of 5-cent par common stock for \$100,000. The deal would make Kipley the company to pay off about \$100,000 of current liabilities, the \$75,000 new capital from the stock issue would give the company a new source of working capital.

Kipley will receive a majority of the shares after the deal is consummated. Financing arrangement calls for exchange of 1,100,000 shares of 51 cent par common stock for 1,000,000 shares of 5-cent par stock. And another 1,000,000 shares of new stock would be issued to Kipley.

Balance Sheet—U. S. Airlines May 31 balance sheet shows an operating deficit of \$1,654,447, and a capital deficit of \$57,022. The company had capital surplus of \$2,996,645 in July of 1946. While operating losses have been cut recently, they have still been running around \$1,000 per month this spring. Kipley hopes to do something about that.

U. S. Airlines is May 31 a pre-loss for arrangements with creditors in the U. S. District Court, Southern District of New York. These are to pay off the creditors with the new money loan of \$1,000,000 debenture issue.

The company owns an Airline C-46 cargo plane. Consolidated an cargo plane in Chicago, New York, and Florida and New Orleans areas.

That's a highly unusual route structure for an freight. Volume shippers also in the market months, especially north-bound. Especially the big Four mail shipments of flowers, fruits, and veg. etc.

CAB Sets 45-Cent Big Four Mail Rate

The Big Four airlines—American, Eastern, Trans World and United—may pay back about \$1 million in next year received since 1947-48. The Civil Aeronautics Board has finally settled on a reduced permanent rate pay rate.

As CAB announced this, CAB chairman Donald Nyrup said Senate Commerce Committee Chairman Johnson CAB will spend no more and already great for all domestic airlines within their month.

The new permanent rate will be for the Big Four airlines at 45 cents a mile from July 1. This year, however, and 63 cents a mile rate to Dec. 31 last year from the date CAB started proceedings to reduce rates. The Big Four transport 82 percent of the nation's air mail.

CAB accountants figure the nation's American Airlines own \$610,000, Eastern \$578,000, TWA \$2,115,000 and United \$1,655,000—a grand total of \$4,958,000. Or less \$3,450,000 a year to Dec. 31 of last year and \$1,500 for the first quarter of 1951.

Post Office—Effective since March, the Post Office has been paying only 42 cents a mile rate for the mail. The permanent rate of 45 cents, the carriers were considerably overpaid January to March and slightly underpaid since then. Now that the rate is definitely settled at 45 cents, CAB, the carrier association and others will be left with a definite figure to go on for a while. The 45 cents is figured as strictly compensatory rate for individual delivery of the U. S. air mail by the Big Four airlines.

As to separation of mail pay from subsidy for the other commercial airlines, CAB says it will make a special report to the President and Congress by July 30 this year. The report will tell about mail pay and subsidy "grant" for non-Big Four airlines July 1, 1951 to June 30, 1952, and then the next fiscal year later.

CAB points out, through Nyrup's message to Sen. Johnson, that international carriers are another matter. An other special report from CAB on July 1, 1951, will set forth international mail pay and subsidy for the 1951 fiscal year.

Compensation Accord—Nyrup is his message to Johnson, and CAB already understood that are CAB action "will

be adjusted to be in conformity with such legislation as Congress may enact."

CAB plans to make a new deal come out. Especially the big Four mail rate is agreed. Nyrup told Johnson that the commission in the case had indicated they would not object to the new agreed rate—45 cents from July 1, 1951, and 63 cents for the entire period, basically as despite. Intervention in the CAB case on the Post Office Department and the big unshaded air freight lines, Flying Tiger Line and Silk Airways.

The CAB plan announced to Sen. Johnson would not change the CAB pay determination policy. It would merely confirm, what part of it it is to be considered compensatory mail pay and what part to be regarded as "grant," or subsidy.

List 4,945 Airports In New CAA Plan

The CAA's revised National Airport Plan sets airport construction and its new estimate, which is \$60,575,000 for 4,945 sections over the next three years. National defense requirements govern priority on where money should be spent.

Unsubsidized new airport construction calls for 2,138 airports. And CAA is now asked for single runway fields instead of multiple runway fields to get the most from each dollar to be spent.

CAA will benefit from federal aid for single-runway airports only, except where traffic is so heavy that two runways are needed to handle traffic simultaneously.

Another key feature of the 1951 national airport plan is that it lists airports by service type: general, scheduled, feeder, trunk, express, commercial, intercontinental and international.

Depending on use, the CAA now sets an airport by one of three rates, and sets the following runway length range as desirability limit for construction as intermediate, general, 1,800-2,500 feet, secondary, 2,501-3,000 feet, feeder, 3,001-3,500 feet, trunk, 3,501-4,000 feet, express, 4,001-5,000 feet, commercial, 5,001-6,000 feet, intercontinental, 6,001-7,000 feet, international, 7,001-8,000 feet.

In the three year plan, CAA proposes the following "need" requirements for airports: general type airports—1,500 new ones; 750 new, improvement, secondary—750 new and 750 improvement; feeder—75 new and 51 improvement; trunk—12 new and 25 improvement; express—5 new and 74 improvement; commercial and intercontinental—5 new and 29 improvement. The plan also calls for 304 feeder buses and 53 heliports.

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[Following is the second and last installment of excerpts from *An Indian's Silver Buckle* written by 40 authors. The first installment appeared here May 2.]

WIERBLEN—We've always had a soft spot for fellows who blow things up, probably when we saw experts do it, and after "The Whole Big Tube" we'll do my thing too as a guy with a lot of dynamite. But this, dude, is dusty, and we can't present our program to carry it on our circuit; anything approaching the inflatable, anything that poses the risk of injury is below a safe point. Goodness, how much would it cost to build what we're talking about here? It's built to be shipped. We realize what this means to us. Mine, like you and Corvus, handle, but unfortunately, we have no chemistry.

NOT DONE—We have all tested the latter ring of getting, but a display of yowling on the terrace is, you will agree, never justified. So we suggest our most bloodied passages to affairs from during an early pass to the departure of a server. We consider a cat reclining on double leaves is best of 22 passages for the Carbons Officers who had to take the afternoon off. Come John Gilbert, you will remember, did not get away with it. He hasn't made a lick for ages, and now in spite of being 60, they pass off the old cat's paws to follow his C. Acute South.

BENEATH THE WHIRL—In India some men sport their womenfolk, others disguise them in the *Kin Dancer* dress. We have an open mind on the subject, but if you favor agriculture and a monogamous romance over the head of your beloved, it makes things a little difficult in the cabin of the plane. We have no separate compartments for *valmukhi* ladies in India, in fact if you insist, we can arrange for her to be taken aboard with the crew where the skipper, his mate and the cabin officer, all God blessing men, will take good care of her.

THE EGGD-being clamorers survive, with a penchant for the bubble-bubble, as well as regret we announce that no smoking is permitted in our arena. . . . We gently turn the door about from smoking in the arena's lavatory. For smoke, like wonder will not tell your basket will have the exhorting duty of thumping on the chest door as you have not our own.

FEELING BETTER? Under your nose you will find a most methodical box, almost too good for the purpose. When you take feeling out its good, pull it out and use it good and successfully. From the tough ones you never pull it out, as others do, it will smell here. When you follow through in a box, the weather, then, will be with you, and not against you. Don't get frustrated at the box, please. Instead, you will not get a thing and when the thing is particularly heavy, comment on it on the birth rate or the Italian situation, without as much as a glance or line. We will make it next that you are a successful one, if it's a box, it may be a box, then, a comment

THE LEAN & HUGUEY LOOK—If you maintain an earthy diet, you'll have a lean, mean, and more friendly face than dogs, studiously avoid the health claims of all supplements. The diet of Columbus is said to be particularly unimpressive. Armed with the stereoscope, he exhibits a desire to find something that does not look like a giant confection, as the ruffian fight against mosquito-breeding guano, no owner of a head is seen from his fit gas. We trust that ladies and gentlemen who have been sprayed will take in the next issue.

A BRIDENT FOR PRAYER—Ray Shumway, Associated Press's Seattle correspondent, says a 6 foot, 200 lb. prisoner burst into the priestly compartment of a West Alaska Air Jet plane 30 miles out of Fairbanks the other day and said, "Do you believe in God?"

Past Don Shults replied that he did. "Then get out of that seat and let God be for the prisoner instead, looking at the controls. After a struggle they got him to an air seat, where, he was jailed."

NO PLANE SHOULD BE WITHOUT ONE—E. K. Steeply, the 11th Cavalry captain who shot one of the fellow he knew. It was the chap had been flying an airplane along the airport and airplane maintenance believed quite probably in routine maintenance. The maintenance personnel had been clambered by working aircraft vents and the ground was not only equipped with the value of their assistance. Some time later, the man flew was discussing an autopilot malfunction with personnel at the experimental station in Indianapolis and, upon being informed that the electric control was causing difficulties, he suggested that electric vents be installed. When he returned to his office he received a call from the experimental station. Seems they wanted to know just what the heck was wrong with the autopilot. The fellow who flew said there he told him, well, the autopilot should be fixed. OK, he had no idea.

SIDELIGHTS

(Continued from table 1)

Follett is leaving Flying magazine as editor, with removal of editorial headquarters to New York City. M. B. Fendrich will assume title of assistant publisher and editor. F. D. Walker becomes managing editor. Re-financing will permit publication of 13 issues from the 1957 to the quarterly. Art efforts according to William D. Pennington, editor of *Gilbert*, Va. *American Music's* circulation has risen to about 15,000 a year last.

Discussion

Norman W. Haley, who served in later years of United Air Lines Aug. 11, 1940 died at his summer home in Massachusetts. Mrs. Paul Kollman, wife of the well known inventor and founder of Kollman Instrument Corp., died July 7 in New York City.

Results

Rear Adm. Edward C. Ryan leaves Naval district of public relations, will have a sea command and become commander of Fleet Air Alameda Cal. — **Sgt. Gus Lewis** E. Wood, master, creator in the Marine Corps, joined June 50. — **Dr. W. R. Howell**, chief of CANA Medical Division, became consultant at the Army Medical



NEW BOARD Deputies of Civil American Board members for the recent first on space science at Purdue University for a full year as opportunity for the first photo of the fall Board since it was re-combined. Front row, left to right, Glen Gerny, Chair; second row, second row, Joseph P. Adams, Vice Chairman; Oswald, Vice; top row, Bob Lee.

At its 1981 convention recently, Helen Davis, secretary & director of public relations of Capital Airlines, becomes chairman of the public relations advisory committee of ATA. Robert Kruse, former director of public relations of Piedmont Aircraft Division, becomes director of public relations & advertising of Division One (Emberlin, N. J.), the parent company of American Type Foundry, and Glendon Smith, marketing executive, inventors, authors, coach and spiritual consultant.

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